


**SECOND FIVE-YEAR REVIEW REPORT FOR
SAN GABRIEL VALLEY SUPERFUND SITE (AREA 4)
LOS ANGELES COUNTY, CALIFORNIA**



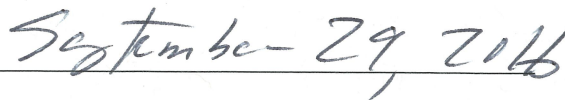
PREPARED BY
U.S. Army Corps of Engineers, Seattle District
FOR
U.S. Environmental Protection Agency
Region IX

Approved by:

Date:



John Lyons, Acting Assistant Director
California Site Cleanup and Enforcement Branch
Superfund Division
U.S. Environmental Protection Agency, Region 9



September 29, 2016

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Executive Summary

This is the Second Five-Year Review (FYR) of the San Gabriel Valley Superfund Site (Area 4), Puente Valley Operable Unit (PVOU), also referred to as the Site. The Site is located primarily within commercial and industrial areas within the City of Industry, the City of La Puente, and within small-unincorporated areas of Los Angeles County, California.

The purpose of this FYR is to review information to determine if the remedy is protective of human health and the environment. The triggering action for this FYR was the signing of the previous FYR on March 2, 2011.

Water purveyors first discovered volatile organic compound (VOC) groundwater contamination in the San Gabriel Valley Groundwater Basin in 1979. In May 1984, the U.S. Environmental Protection Agency (EPA) placed four regional groundwater contamination Areas within the San Gabriel Valley Basin onto its National Priorities List (NPL). The PVOU, or Area 4, lies within the Puente Valley, a “horn-shaped” valley with an approximately 12.5-mile-long by 2- to 2.5-mile-wide groundwater sub-basin located within the San Gabriel Valley Groundwater Basin.

Beginning in 1985, EPA initiated its enforcement efforts by searching historical federal, state, and local records for evidence of chemical usage, handling, and disposal in PVOU.

Sources of groundwater contamination correlated with chemical usage by firms engaged in various business operations including: metal cleaning, coating, and manufacturing; chemical product manufacturing of plastics and aerosols; electric component manufacturing; printing; rubber manufacturing; and, die casting. The most prevalent groundwater VOC contaminants found in the PVOU include tetrachloroethene (PCE), trichloroethylene (TCE), and 1,1-dichloroethene (1,1-DCE). Other detected groundwater contaminants include 1,4-dioxane, and perchlorate.

In the 1998 Interim Record of Decision (ROD), EPA selected groundwater control in the shallow and intermediate zones at the mouth of Puente Valley (where the Puente Valley meets the San Gabriel Valley Groundwater Basin) as the interim remedy for the PVOU to meet the following remedial action objectives (RAOs):

- Prevent exposure of the public to contaminated groundwater
- Inhibit contaminant migration from the more highly contaminated portions of the aquifer to the less contaminated areas or depths
- Reduce the impact of continued contaminant migration on downgradient water supply wells
- Protect future uses of less contaminated and uncontaminated areas

The interim remedy consists of the following components:

- Groundwater extraction from the shallow and intermediate aquifer zones
- Treatment of extracted groundwater prior to discharge

- Discharge of treated water to surface water or to a water supply line for municipal use
- Monitoring to ensure compliance with RAOs and performance criteria in the shallow, intermediate, and deep groundwater zones and to serve as an early warning system for extraction and treatment systems

The remedy uses a performance-based approach with shallow zone and intermediate zone treatment systems designed to meet specific performance criteria. The IROD performance criterion for the shallow zone is “... *prevent groundwater in the shallow zone with above ten times ARARs listed in Table 1¹ from migrating beyond its current lateral and vertical extent as described in the RI/FS for PVOU.*” The IROD performance criterion for the intermediate zone is to “*provide sufficient hydraulic control to prevent groundwater above ARARS listed in Table 1 from migrating beyond the B7 Well Field Area...*”

In 2005, an Explanation of Significant Differences (ESD) was issued to address two additional contaminants: 1,4-dioxane and perchlorate, and clarified the performance criteria described above. The shallow zone performance criteria language was clarified to “*The Remedial Action shall prevent groundwater at the mouth of the Puente Valley with contamination greater than or equal to ten times the levels listed in Table 2² from (1) migrating beyond its lateral extent as measured at the time the shallow zone remedial action containment system is Operational and Functional; and (2) migrating vertically into the intermediate zone.*” The intermediate zone performance criteria language was clarified to “*The Remedial Action shall prevent groundwater in the intermediate zone at the mouth of the Puente Valley, with contamination greater than or equal to the levels listed in Table 2 from (1) migrating beyond its lateral extent as measured at the time the intermediate zone remedial action containment system is Operational and Functional; and (2) migrating vertically into the deep zone.*” Additionally, a surface water discharge level for perchlorate was described in the ESD.

To date, the Potentially Responsible Parties (PRPs) have installed extraction wells, segments of the conveyance piping, well vaults, pumps, and controls, and perform semiannual groundwater monitoring. However, the groundwater extraction and treatment systems for both zones are not constructed.

Based on EPA’s evaluation of groundwater monitoring data collected between 2010 and 2015, the lateral extent of contamination in both the shallow and intermediate zones has not changed significantly; however, plume boundaries are only poorly defined.

Within the intermediate zone groundwater contaminant plume, two operating production wells (drinking water supply wells) have well screen intervals in both the intermediate and deep zones. Analytical sampling results from one well (B11B) have reported concentrations of Site-related contamination above ARARs since 2002; however, the water purveyor uses an air stripper to remove VOCs prior to further treatment (e.g., chlorination) and distribution into the drinking water supply. The other production well

¹ Table 1: Lists various VOCs; however, PCE, TCE, and 1,1-DCE are the primary COCs found in groundwater.

² (From the 2005 ESD) The values in Table 2 are identical to Table 1 of the interim ROD, except 1,4 dioxane is added to the chemical requiring containment and chemicals that had no associated value in the Interim ROD were deleted.

(147W3) has no treatment; however, Site-related contamination levels reported in sampling results from this well have consistently been below ARARs.

In addition to Site-related contamination in water production wells, EPA identified a complete vapor intrusion (VI) exposure pathway in one commercial/industrial building near one of the primary VOC contamination source areas - the former TRW Benchmark facility. VI investigation (e.g., indoor air sampling) and assessment work is scheduled for 2017 at residential buildings located near the former TRW Benchmark facility. This work will take approximately one year to complete.

A protectiveness determination of the remedy at San Gabriel Valley, Area 4, cannot be made at this time until further information is obtained. Further information will be obtained by completing the additional vapor intrusion investigation and assessment. It is expected that this action will take approximately one year to complete, at which time a protectiveness determination will be made. Meanwhile, exposure pathways presenting unacceptable risks from contaminated groundwater are controlled. Further, in order for the remedy to be protective in the long-term, the following actions are required: (1) Design, construct, and operate groundwater remedial systems to meet RAOs; (2) Evaluate vapor intrusion pathways for residential buildings located near the former TRW Benchmark facility (3) Revise the Sampling and Analysis Plan to include groundwater monitoring of production wells impacted by Site-related groundwater contamination, including, SWS 147W3; (4) Install additional monitoring wells to better define the extent of groundwater contamination in the shallow zone and intermediate zone; (5) Properly destroy any inactive water production well(s) providing a vertical conduit for Site-related groundwater contamination migration; and, (6) Evaluate detections of hexavalent chromium relative to remedial action objectives to prevent exposure of the public to contaminated groundwater i.e., protection of production wells, and to reduce the impact of continued contaminant migration on water supply wells.

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List of Acronyms and Abbreviations

| | |
|--------------------------|---|
| $\mu\text{g}/\text{m}^3$ | micrograms per cubic meter |
| $\mu\text{g}/\text{L}$ | micrograms per liter |
| ARAR | Applicable or relevant and appropriate requirements |
| bgs | below ground surface |
| CAO | Cleanup and Abatement Order |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| COC | Contaminant of concern |
| CTR | California Toxics Rule |
| DCA | Dichloroethane |
| DCE | Dichloroethene |
| DZ | Deep zone |
| EPA | U.S. Environmental Protection Agency |
| ESD | Explanation of Significant Differences |
| FYR | Five-Year Review |
| gpm | gallons per minute |
| IRIS | Integrated Risk Information System |
| IZ | Intermediate zone |
| LARWQCB | Los Angeles Regional Water Quality Control Board |
| MCL | Maximum Contaminant Level |
| MSL | Mean sea level |
| NCP | National Contingency Plan |
| NDMA | <i>n</i> -nitrosodimethylamine |
| NPDES | National Pollutant Discharge Elimination System |
| NPL | National Priorities List |
| O&M | Operations and maintenance |
| PCE | Tetrachloroethene |
| PRP | Potentially responsible party |

| | |
|-------|--|
| PVOU | Puente Valley Operable Unit |
| PZ | Production zone |
| RA | Remedial action |
| RAOs | Remedial action objectives |
| RD | Remedial design |
| RI/FS | Remedial investigation/feasibility study |
| ROD | Record of Decision |
| RPM | Remedial project manager |
| RSL | Regional Screening Level |
| SGVWC | San Gabriel Valley Water Company |
| SVE | Soil vapor extraction |
| SWS | Suburban Water Systems |
| SZ | Shallow zone |
| TCA | Trichloroethane |
| TCE | Trichloroethylene |
| THMs | Trihalomethanes |
| UAO | Unilateral Administrative Order |
| USACE | U.S. Army Corps of Engineers |
| UTC | United Technologies Corporation |
| UU/UE | Unlimited use and unrestricted exposure |
| VOC | Volatile organic compound |

1. Introduction

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, 40 Code of Federal Regulation (CFR) Section 300.430(f)(4)(ii) of the National Contingency Plan (NCP) and EPA policy.

This is the Second FYR for the San Gabriel Valley Superfund Site (Area 4), Puente Valley Operable Unit (PVOU), also referred to as the Site. The triggering action for this statutory review was the signing of the previous FYR on March 2, 2011. The FYR has been prepared because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

Raymond Chavira, EPA Remedial Project Manager (RPM), led the San Gabriel Valley Superfund Site (Area 4) Second Five-Year Review. Participants from the Seattle District of the U.S. Army Corps of Engineers (USACE) included Marlowe Laubach (chemical engineer), Rick Garrison (geologist), and Jon Moen (geologist). The review began on 2/2/2016.

Table 1-1: Five-Year Review Summary Form

| SITE IDENTIFICATION | | |
|---|--|--|
| Site Name: San Gabriel Valley (Area 4), Puente Valley Operable Unit | | |
| EPA ID: CAD980817985 | | |
| Region: 9 | State: CA | City/County: Los Angeles County |
| SITE STATUS | | |
| NPL Status: Final | | |
| Multiple OUs? No | Has the site achieved construction completion? No | |
| REVIEW STATUS | | |
| Lead agency: EPA <i>[If "Other Federal Agency", enter Agency name]:</i> | | |
| Author name (Federal or State Project Manager): Raymond Chavira | | |
| Author affiliation: EPA Region 9 | | |
| Review period: 2/2/2016 – 8/5/2016 | | |
| Date of site inspection: 2/18/2016 | | |
| Type of review: Statutory | | |
| Review number: 2 | | |
| Triggering action date: 3/2/2011 | | |
| Due date (five years after triggering action date): 9/30/2016 | | |

1.1. Background

The Puente Valley Operable Unit (PVOU) (Figure 1-1), also referred to as the Site, is located primarily within commercial and industrial areas in the City of Industry, the City of La Puente, and within small-unincorporated areas of Los Angeles County, California.

Water purveyors first discovered volatile organic compound (VOC) groundwater contamination in the San Gabriel Valley Basin in 1979. In May 1984, the U.S. Environmental Protection Agency (EPA) placed four-groundwater contamination Areas within the San Gabriel Valley Basin onto its National Priorities List (NPL). One of these Areas, PVOU, or Area 4, is located with the Puente Valley, a “horn-shaped” valley with an approximately 12.5-mile-long by 2- to 2.5-mile-wide groundwater sub-basin within the San Gabriel Valley Groundwater Basin³.

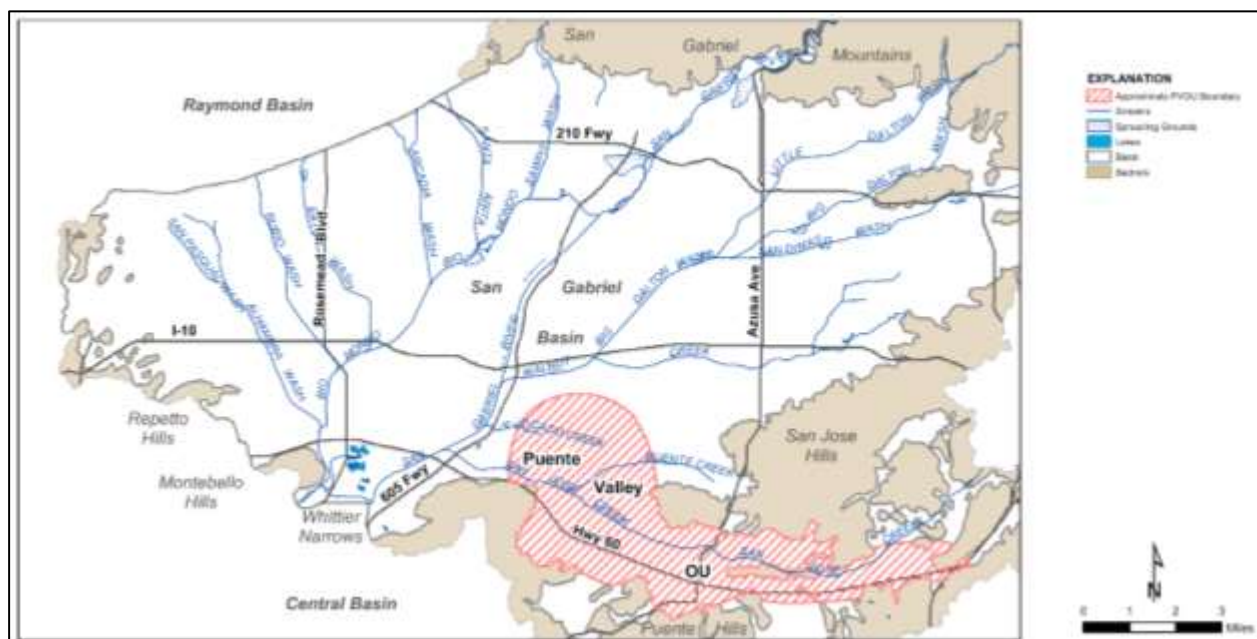


Figure 1-1: Location Map for the San Gabriel Valley Superfund Site (Area 4) PVOU

Beginning in 1985, EPA initiated its enforcement efforts by searching historical federal, state, and local records for evidence of chemical usage, handling, and disposal in PVOU. In 1989, EPA entered into an agreement with the Los Angeles Regional Water Quality Control Board (LARWQCB) to expand its Well Investigation Program, which led to the development and initiation of several response actions by the LARWQCB through its site-specific cleanup requests and Cleanup and Abatement Orders (CAOs). Response actions were subsequently taken by multiple potentially responsible parties (PRPs) including Carrier Corporation (now a wholly owned subsidiary of the United Technologies Corporation (UTC)) and Northrop Grumman (formerly TRW), at both “mid valley” and “mouth” of the valley (Figure 1-2),” the

³: The San Gabriel Valley Groundwater Basin was formerly separated into Eastern and Western areas. Since these areas had the same beneficial uses as the Puente basin all three areas have been combined into the San Gabriel Valley. (Los Angeles Regional Water Quality Control Board Basin Plan, Table 2.2, Beneficial Uses of Groundwater, DWR Basin No.4-13, San Gabriel Valley, footnote ai,)

location of EPA's current remedial action and the subject of this 5YR, in the PVOU. Although many of the state's response actions within the PVOU relate to investigation and remediation of on-property soils and to a limited extent groundwater contamination where releases have occurred, the major facilities that contributed to the regional groundwater contamination, listing of the PVOU on the National Priorities List, and eventual Interim ROD are briefly described below. During the supplemental Remedial Investigation and Feasibility Study for the final ROD, EPA will work with the state to identify and remediate any remaining sources found to be contributing to groundwater contamination within the PVOU.

State Response Actions – Mid Valley Area

In 1986, under LARWQCB's CAO #86-1, Carrier implemented several response actions at the former BDP Carrier facility including the removal of a degreaser sump, the construction and operation of a groundwater pump and treat system (1986), and construction and operation of a soil vapor extraction system (1989). The groundwater remediation system continues to extract approximately 250 gallons per minute (gpm) of groundwater and discharges the treated water to the municipal sewer, or provides it for irrigation use in the Puente Basin.

State Response Actions – “Mouth” of the Valley (MOV) Area

In 1989, LARWQCB issued CAO #89-034 to TRW and in response; TRW removed storage tanks and contaminated soils containing VOCs and hexavalent chromium at the former Benchmark Technology facility. TRW also started operation of an SVE system in 1993 and a groundwater extraction system and treatment system in 1995. As of 2009, all remedial systems at the former TRW Benchmark facility were shut down.

In 2002, the LARWQCB requested the PRPs in the PVOU to collect and analyze groundwater samples from selected shallow, facility-specific monitoring wells within the area of VOC contamination for emergent chemicals including perchlorate, 1,4-dioxane, *n*-nitrosodimethylamine (NDMA), and hexavalent chromium. Although all four of the emergent compounds were detected in groundwater analytical samples, the results indicated that only 1,4-dioxane was present at concentrations requiring containment.

Sources of groundwater contamination correlated with chemical usage by firms engaged in various business operations including metal cleaning, coating, and manufacturing; chemical product manufacturing of plastics and aerosols; electric component manufacturing; printing; rubber manufacturing; and die-casting.

The most prevalent groundwater contaminants found in the PVOU include VOCs (mainly tetrachloroethene [PCE], trichloroethylene [TCE], 1,1-dichloroethene [1,1-DCE], 1,4-dioxane, perchlorate, and hexavalent chromium.

1.2. *Physical Characteristics*

The Puente Valley is a tributary basin to the San Gabriel Valley Groundwater Basin (SGVGB) (Figure 1-1). The SGVGB is bounded by several geologic features including the San Gabriel Mountains to the

north, the Raymond Basin fault to the northwest, and a crescent-shaped system of low hills to the southwest, south, and southeast. The hills making up the system are, from west to east, the Repetto, Montebello, Puente, and San Jose Hills. The only significant disruption of this boundary is Whittier Narrows located between the Montebello and Puente Hills. Whittier Narrows is the lowest point in the SGVGB and serves as the surface water and groundwater discharge locale for the basin (EPA, 2011a).

The Puente Valley is a “horn-shaped” valley that opens into the SGVGB on the west and on the north. The ground surface elevations in the Puente Valley, bounded to the north by the San Jose Hills and to the south by the Puente Hills, range in height from about 800 feet above mean sea level (MSL) at the eastern boundary to about 300 feet above MSL where it intersects with the main portion of the SGVGB. Groundwater is a source of drinking water in the Puente Valley.

The primary surface water bodies in the SGVGB are the San Gabriel and the Rio Hondo Rivers and their tributaries (Figure 1-1). Both the San Gabriel and Rio Hondo headwaters originate in the San Gabriel Mountains and exit the SGVGB at the Whittier Narrows.

San Jose Creek, a tributary of the San Gabriel River, is the primary surface water drainage within the Puente Valley. It is a perennial stream sustained by discharges from municipal and industrial wastewater treatment plants, and discharge of groundwater into the stream through the weep holes at the channel bottom. Most of the channel reaches of San Jose Creek within the Puente Valley are concrete-lined. The lined portions of the channel are underlain by a subdrain system designed to allow exchange between surface water and shallow groundwater through weep holes in the concrete walls. Puente Creek is a lined channel tributary to San Jose Creek. Puente Creek originates from the northern slopes of San Jose Hills and joins the San Jose Creek in the northern portion of the Puente Valley. Both San Jose Creek and Puente Creek convey stormwater runoff within the PVOU, which occurs primarily during the winter rainy season.

The Puente Valley region has a Mediterranean climate with dry summers and precipitation occurring mainly in the winter months. The mean seasonal temperature in Puente Valley ranges from 54 degrees Fahrenheit in January to 90 degrees Fahrenheit in July and August.

1.3. Hydrology

1.3.1. Regional Hydrology

The principal water-bearing formations of the SGVGB are unconsolidated and semi-consolidated sediments, which range in size from coarse gravel to fine-grained sands. The source materials for these sediments are granitic and metamorphic rocks in the San Gabriel Mountains to the north. These water-bearing sediments vary from a few hundred feet thick along the edges of the Basin to more than 4,000 feet thick near the center of the Basin and are surrounded and underlain by relatively impermeable marine sedimentary bedrock. Sediments in the Puente Valley groundwater sub-basin are finer-grained than those found in the central portion of the SGVGB. The main source materials for the Puente Valley groundwater sub-basin deposits are consolidated sedimentary rocks of the surrounding hills. These sediments range in thickness from approximately 1,300 feet near the mouth of the valley, to less than 25 feet in the eastern portion of the valley and along the valley perimeter.

The sub-basin's major sources of natural recharge are infiltration of rainfall on the valley floor and percolation of runoff from the adjacent mountains. The sub-basin also receives imported water and return flow from applied water. Most of spreading basins for imported water are located along the San Gabriel River; no spreading basins are in the Puente Valley. Most of the surface streams in the San Gabriel Valley Groundwater Basin are concrete lined except the San Gabriel River and an approximately three-mile reach of the Rio Hondo. Exchange between surface water and groundwater only occurs along the unlined stretches through the bottom of the stream channels. Recharge also occurs from several lakes near Whittier Narrows. Subsurface groundwater flow into the San Gabriel Valley Groundwater Basin occurs across the Raymond Fault in the northwest, the Sierra Madre Fault in the north, and the Cucamonga Fault in the northeast. Except where large pumping centers create local groundwater sinks, groundwater generally flows from the perimeters of the basin toward Whittier Narrows and from there into the Central Basin.

Based on monitoring well data, regional groundwater levels in the San Gabriel Valley Groundwater Basin have declined over the past five years. Climatically induced fluctuations in natural recharge, groundwater pumping from the public water supply wells, and recharge of imported water are the most important forces that control water level changes in the Puente Valley. The most significant groundwater pumping within PVOU occurs from several large public water supply wells in the B7 Well Field located at the mouth of the Puente Valley. While these wells extract most of their water from the deep zone, some of the wells also get a substantial amount of water from the intermediate zone. The San Gabriel Valley Water Company (SGVWC) and Suburban Water Systems (SWS) currently own and operate all of the public water supply wells within the PVOU.

1.3.2. Hydrogeologic Units of the Puente Valley

The unconsolidated sediments in the mouth of Puente Valley area make up several hydrostratigraphic units. Three primary coarse-grained, higher permeability units (or aquifers), described in Site documents as the shallow zone (SZ), the intermediate zone (IZ), and the deep zone (DZ), are hydraulically contiguous across the PVOU, and separated by silt and clay confining layers (aquitards) which allow for vertical head and water quality differences between each Zone.

The hydrostratigraphic units in the mouth of Puente Valley area dip to the north and west, as the geology of Puente Valley transitions to the central portion of the San Gabriel Valley Groundwater Basin; therefore, the depths of the hydrogeologic units increase to the north and west. The units fold with the Industry syncline located along the center of the Puente Valley in the mouth of Puente Valley area and Walnut anticline located to the northeast of the syncline. The Walnut Creek fault extends to the mouth of Puente Valley area from the northeast, likely terminating near the former TRW Benchmark facility. The fault may act as a barrier to groundwater flow; however, how the fault affects PVOU groundwater flow is still unknown.

At the mouth of Puente Valley (Figure 1-2), the shallow zone extends, depending on location, from the water table at approximately 50 to 200 feet below ground surface (bgs) to approximately 250 to 300 bgs (EPA, 2005). The shallow zone includes two fine-grained units further divided into the upper Shallow Zone (SZ1) and lower Shallow Zone (SZ2). A laterally continuous aquitard unit, referred to as the Galaxy Clay, separates the SZ and IZ.

The shallow zone contains most of the VOC contaminant mass, with contaminant concentrations in some locations reaching hundreds of times drinking water standards (EPA, 2005). The majority of the contaminant mass originating at the mouth of Puente Valley is migrating within the shallow zone to the north and northwest; however, there is a downward hydraulic gradient in the area and some contaminant mass is migrating downward and into the intermediate zone, particularly in the southeastern portion of the MOV area (Figure 1-2).

Depending on location, the IZ extends from approximately 100 feet bgs down to 400 feet bgs. There are two sub-units within the intermediate zone, the upper intermediate zone (UIZ) and lower intermediate zone (LIZ). The LIZ is further sub-divided into the upper and lower portions or LIZ1 and LIZ2, respectively. Several production wells at the mouth of Puente Valley produce water from the intermediate zone (e.g., screened intervals starting at 280 and 300 feet bgs), although the deep zone is the primary source for groundwater production in the mouth of Puente Valley.

VOC contaminant concentrations found in the intermediate zone, while lower than those found in the shallow zone, still exceed drinking water standards (Figure 1-2). All VOC contamination in the intermediate zone originated in the shallow zone from the MOV and from sources in the “mid-valley” of Puente Valley. The “mid-valley” area generally encompasses the groundwater area from Azusa Avenue to Hacienda Boulevard (Figure 1-2). The majority of the contaminant mass is in the UIZ.

The deep zone (DZ) aquifer is used for domestic groundwater production. In general, at the mouth of Puente Valley, the deep zone extends from a depth of approximately 400 to 1,130 feet bgs (EPA, 2011a). Several production wells screened in the DZ currently operate at the MOV. Because production wells at the MOV produce most of their water from the deep zone, hydraulic heads observed in this zone are comparatively lower than those found in the shallow and intermediate zones. Historically, this zone has not exhibited contamination although recently, VOC contamination at low concentrations have been reported in analytical sampling results collected from monitoring wells screened in the uppermost portion of the deep zone.

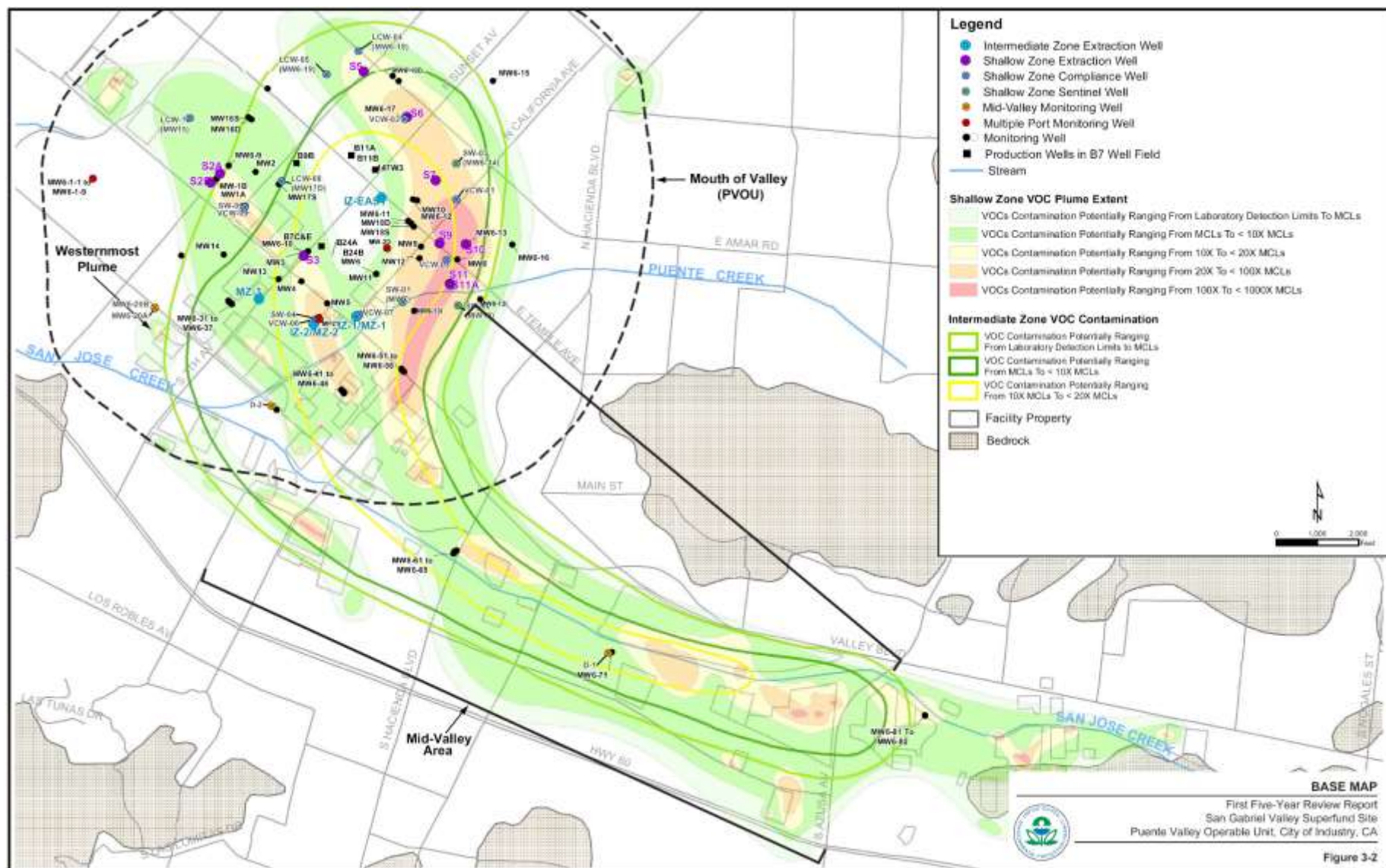


Figure 1-2: Detailed Map of the San Gabriel Valley Superfund Site (Area 4) PVOU

2. Remedial Actions Summary

2.1. Basis for Taking Action

In 1994, EPA completed the *Preliminary Baseline Risk Assessment for the Puente Valley Operable Unit*. The purpose of the risk assessment was to evaluate potential adverse human health effects from exposure to contaminated groundwater (EPA, 2011a). The risk assessment concluded that actual or threatened releases of hazardous substances at this Site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare, or the environment.

VOCs are the primary Site-related contaminants of concern (COCs) presented in the 1998 Interim Record of Decision (ROD). PCE, TCE, and 1,1-DCE are the three most frequently detected COCs. VOC groundwater contamination occurs primarily in the shallow and intermediate zone aquifers. Two additional contaminants, 1,4-dioxane and perchlorate, were added later under the 2005 Explanation of Significant Differences (ESD).

2.2. Remedy Selection

The 1998 Interim ROD Remedial Action Objectives (RAOs) for the selected remedy are:

- Prevent exposure of the public to contaminated groundwater
- Inhibit contaminant migration from the more highly contaminated portions of the aquifer to the less contaminated areas or depths
- Reduce the impact of continued contaminant migration on downgradient water supply wells
- Protect future uses of less contaminated and uncontaminated areas

The RAOs reflected EPA's regulatory goal of restoring usable ground waters to their beneficial uses wherever practicable, within a time frame that is reasonable; or, if restoration is deemed impracticable, to prevent further migration of the plume, prevent exposure to the contaminated ground water, and evaluate further risk reduction (40 CFR Section 300.430(a)(1)(iii)(F)).

The RAOs for the PVOU did not include numeric, chemical-specific objectives in the aquifer or a time frame for restoration because this is an interim action. They do include VOC "mass removal" as a secondary objective. EPA's selected alternative will remove significant contaminant mass from the aquifer, in effect beginning the restoration process, but it will be designed for migration control rather than mass removal.

2.2.1. 1998 Interim ROD

The Interim ROD selected Alternative 3, hydraulic control of Site-related groundwater contamination in the shallow and intermediate zones at the mouth of Puente Valley. The selected remedy consists of the following components:

- **Extraction:** The ground-water extraction in Alternative 3 includes four wells in each zone (shallow and intermediate). The total extraction rates from the shallow and intermediate zones are 700 and 1,000 gallons per minute (gpm), respectively, for a total flow of 1,700 gpm. The actual extraction well locations and rates will be determined during remedial design based on additional evaluation of the extent of contamination during the remedial design investigation.
- **Treatment:** Extracted ground water will be treated by either air stripping with offgas treatment or liquid-phase carbon adsorption to remove VOCs prior to discharge. For cost estimation purposes, this alternative assumes a treatment system using air stripping with adsorption of VOCs in offgas. Construction of a single 1,700-gpm, centralized treatment plant near the mouth extraction system is assumed for this alternative. If water were discharged to a municipal water supply system, treatment to reduce concentrations of total dissolved solids (TDS) and nitrate would probably be required for shallow ground water. The assumed level of treatment for inorganic constituents, if required, would be to the MCL or secondary drinking water standard, as applicable. In the FS, a membrane separation process was assumed for discharge to a municipal water supply system.
- **Conveyance:** Treated ground water may be discharged to Puente Creek or other surface waters or provided to a municipal supply system. Preliminary evaluations that PVSC conducted indicate that there are nearby water distribution systems operated by San Gabriel Valley Water Company, Suburban Water Systems, and the City of Industry. These purveyors have indicated that the water demands for any of these nearby systems substantially exceed the ground-water extraction rate assumed for this alternative.
- **Discharge:** As described above, treated water may be discharged either to surface waters or to a water supply line for municipal use.
- **Monitoring:** Alternative 3 also includes a monitoring system to ensure compliance with RAOs and performance criteria in the shallow, intermediate, and deep zones at mid-valley and the mouth of the valley. In addition, selected monitoring wells may provide an early warning system for extraction and treatment systems. A total of 12 new wells was assumed: 4 new wells downgradient of mid-valley in the intermediate and deep zones, and 8 new wells near the mouth of the valley in the shallow and intermediate zones. Implementation of this monitoring program during the initial stages of the remedial design will help to define design parameters.

The remedy uses a performance-based approach with shallow zone and intermediate zone treatment systems designed to meet specific performance criteria. The IROD performance criterion for the shallow zone is:

“... prevent groundwater in the shallow zone with above ten times ARARs listed in Table 1⁴ from migrating beyond its current lateral and vertical extent as described in the RI/FS for PVOU.”

The IROD performance criterion for the intermediate zone is:

⁴ IROD Table 1 is presented in this FYR, further below, as Table 2-1 Contaminants of Concern and Interim ROD ARARs

“...provide sufficient hydraulic control to prevent groundwater above ARARS listed in Table 1 from migrating beyond the B7 Well Field Area...”

The B7 Well Field Area is defined as the area encompassed by: (1) the wells listed below in Table 2-2, and (2) the current downgradient extent of contamination above standards in the intermediate zone, in the vicinity of the wells listed in Table 2-2.

2.2.2. 2005 ESD

In 2005, an Explanation of Significant Differences (ESD) was issued to address two additional contaminants, 1,4-dioxane and perchlorate, and clarified the shallow zone and intermediate zone performance criteria.

The shallow zone performance criteria language was clarified to:

“The Remedial Action shall prevent groundwater at the mouth of the Puente Valley with contamination greater than or equal to ten times the levels listed in Table 2⁵ from (1) migrating beyond its lateral extent as measured at the time the shallow zone remedial action containment system is Operational and Functional; and (2) migrating vertically into the intermediate zone.”

The intermediate zone performance criteria language was clarified to:

“The Remedial Action shall prevent groundwater in the intermediate zone at the mouth of the Puente Valley, with contamination greater than or equal to the levels listed in Table 2 from (1) migrating beyond its lateral extent as measured at the time the intermediate zone remedial action containment system is Operational and Functional; and (2) migrating vertically into the deep zone.”

The ESD also presented updated total groundwater extraction rates (from 1,700 gpm to 2,375 gpm), COC treatment technologies (e.g., ion exchange or biological treatment for perchlorate), project costs, and modified the areas of containment to “reflect the current state of the plume.” Additionally, the ESD clarified that the shallow zone Remedial Action south of Puente Creek would be conducted by Northrop Grumman under Regional Water Board authority.

⁵ (From the 2005 ESD) The values in Table 2 are identical to Table 1 of the interim ROD, except 1,4 dioxane is added to the chemical requiring containment and chemicals that had no associated value in the Interim ROD were deleted. The 2005 ESD did not identify a standard for perchlorate for which to assess performance of the remedy; rather the ESD selected the California Perchlorate MCL (6 ug/L) as a surface water discharge standard for treated water.

Table 2-1: Contaminants of Concern and Interim ROD ARARs

| Contaminant of Concern | 1998 Interim ROD ARAR¹ (µg/L) | Basis |
|---------------------------------------|---|------------------------------|
| 1,1-Dichloroethane | 5 | California MCL |
| 1,1-Dichloroethene | 6 | California MCL |
| 1,1,1-Trichloroethane | 200 | Federal MCL |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 1,200 | California MCL |
| 1,1,2-Trichloroethane | 3 | Federal MCLG |
| 1,1,2,2-Tetrachloroethane | 1 | California MCL |
| 1,2-Dichlorobenzene | 600 | Federal MCL |
| 1,2-Dichloroethane | 0.5 | California MCL |
| 1,2-Dichloroethene (total) | 6 ¹ | California MCL |
| 1,2-Dichloropropane | 5 | Federal MCL |
| 1,2,4-Trichlorobenzene | 70 | Federal MCL |
| 1,3-Dichlorobenzene | 600 | Federal MCL |
| 1,3-Dichloropropene | 0.5 | California MCL |
| 1,4-Dichlorobenzene | 5 | California MCL |
| 1,4-Dioxane ² | 3 | DHS State Notification Level |
| Benzene | 1 | California MCL |
| bis(2-Ethylhexyl)phthalate | 4 | California MCL |
| Bromodichloromethane ³ | 100 | Federal MCL |
| Bromoform ³ | 100 | Federal MCL |
| Carbon tetrachloride | 0.5 | California MCL |
| Chlorobenzene | 70 | California MCL |
| Chloroform ³ | 100 | Federal MCL |
| <i>cis</i> -1,2-Dichloroethene | 6 | California MCL |
| Dibromochloromethane ³ | 100 | Federal MCL |
| Dibromochloropropane | 0.2 | Federal MCL |
| Ethylbenzene | 700 | Federal MCL |
| Methylene chloride | 5 | Federal MCL |
| Styrene | 100 | Federal MCL |
| Tetrachloroethene | 5 | Federal MCL |
| <i>trans</i> -1,2-Dichloroethene | 10 | California MCL |
| Trichloroethylene | 5 | Federal MCL |
| Trichlorofluoromethane | 150 | California MCL |
| Toluene | 150 | California MCL |
| Vinyl chloride | 0.5 | California MCL |
| Xylenes, total | 1,750 | California MCL |

¹These standards are identified in the interim ROD and 2005 ESD for use as performance criteria. These are not cleanup standards.

²Added in the 2005 ESD.

³These chemicals are trihalomethanes (THMs); the Maximum Contaminant Level (MCL) listed is for all four THMs: chloroform, bromodichloromethane, dibromochloromethane, and bromoform.

Table 2-2: B7 Well Field Area Production Wells Identified in the ROD

| Well Identification | Station Identification/PS-Code[#] |
|----------------------------|---|
| 152W1 | 01900337 |
| 147W1 | 01901596 |
| 105W1 | 01901608 |
| 134W1 | 01901623 |
| 150W1 | 01902519 |
| 147W3 | 08000077 |
| B7E | 08000122 |
| <i>B9</i> | <i>91901437</i> |
| <i>B11A</i> | <i>91901439</i> |
| <i>B7B</i> | <i>91901440</i> |
| <i>B7C</i> | <i>98000068</i> |
| B7D | 98000094 |
| B9B | 98000099 |
| B11B | 98000108 |
| B24A* | 1910039-117 |
| B24B* | 1910039-116 |
| B24C* | 1910030-223 |

Notes:

Bold indicates active wells.

Bold and italic indicate inactive wells.

= PS-Code replaced Station ID

* = New wells installed within the B7 Well Field since IROD and ESD

2.3. Remedy Implementation

2.3.1. Shallow Zone North (SZ North) of Puente Creek

Following the issuance of the 1998 Interim ROD, EPA conducted an additional field investigation to support the remedial design for the Shallow Zone remedy both north and south of Puente Creek. EPA installed eleven monitoring wells between July 2002 and March 2003 and collected discrete-depth samples during the installation of these wells to determine a profile of the shallow zone plume at each location. These field efforts led to an updated Site conceptual model of the VOC contamination in the Shallow Zone. Specifically, the eastern lobe of the SZ plume originating from the former TRW Benchmark facility was found to extend laterally much further north and vertically deeper than what had been concluded earlier between 1994 and 1997 during the development of the RI/FS.

In 2001, EPA prepared a preliminary design of the Shallow Zone extraction network based on the contaminant distributions known at that time. The preliminary design included a treatment plant that would receive effluent piped from proposed Shallow Zone extraction wells.

Following negotiations between EPA and Carrier/United Technologies Corporation (UTC), which resulted in an agreement in principle for performance of the shallow zone remedy north of Puente Creek,

Carrier/UTC took over the preliminary design in December 2004 and continued the remedial design and remedial action work for the SZ remedy located north of Puente Creek. In April 2006, EPA and Carrier entered into a consent decree in which Carrier/UTC committed to design, construct, operate, maintain, monitor, and evaluate the PVOU shallow zone interim remedy north of Puente Creek. In addition, the consent decree requires Carrier/UTC to implement and conduct the Mid-Valley monitoring program and the monitoring program for the Westernmost Plume Area (Figure 1-2).

Carrier/UTC installed nine SZ North extraction wells between March 2006 and August 2007. Geophysical borehole logging was conducted and discrete-depth samples were collected during the installation of these extraction wells. Aquifer tests were conducted following the installation of the extraction wells. Data generated from the installation of the extraction wells provided additional information regarding the subsurface hydrogeology and the lateral and vertical distribution of chemical contaminants.

In June 2009, after Carrier/UTC submitted a draft final design of the SZ North remedy, the Los Angeles County Department of Public Works, Flood Control Division (L.A. County) and the LARWQCB objected to the planned surface water discharge of SZ North and IZ treated groundwater because the treated groundwater contained naturally occurring selenium above the California Toxics Rule (CTR) freshwater criterion of 5 micrograms per liter ($\mu\text{g/L}$). L.A. County, which owns and operates the flood control channel, would not permit access to discharge treated groundwater into its system because it asserted the discharge could potentially result in a violation of its National Pollutant Discharge Elimination System (NPDES) MS4 permit. In August 2009, EPA requested Carrier/UTC to conduct a focused feasibility study to address the discharge issue. In response, Carrier/UTC submitted the *Focused Feasibility Study for the PVOU Shallow Zone Remedy* in May 2010 describing alternative end uses of the treated groundwater (EPA, 2011a) including reinjection.

Since the first FYR, UTC/ Carrier has completed the following actions:

- Conducted semi-annual groundwater monitoring to assess baseline PVOU shallow zone aquifer conditions
- Purchased a property in the City of La Puente to construct the proposed groundwater treatment facility for the Shallow Zone North remedy
- Installed additional monitoring wells in the PVOU shallow zone “eastern” plume, at and adjacent to Amar Road, and immediately adjacent to and cross gradient of the proposed PVOU Shallow Zone North reinjection area
- Installed piezometers at the reinjection area at proposed Amar Road treatment facility
- Conducted baseline groundwater quality sampling at Amar Road treatment facility and assessed background groundwater quality

In October 2014, UTC notified EPA that it was putting further remedial design work required under the 2006 Carrier Consent Decree on hold. EPA expects UTC to re-start design work pending approval of reinjection as an alternative discharge option.

2.3.2. Shallow Zone South (SZ South) of Puente Creek

The former TRW Benchmark Technology facility located south of Puente Creek is the largest single source of VOC and 1,4-dioxane contamination in the eastern shallow zone aquifer, or SZ South. Since 2003, the shallow zone groundwater cleanup south of Puente Creek was implemented by Northrop Grumman under LARWQCB Cleanup and Abatement Order 89-034

On February 23, 2005, the LARWQCB issued a letter to Northrop Grumman requiring the design and installation of a groundwater extraction and treatment system to contain the shallow zone groundwater plume downgradient of the former TRW Benchmark facility. This system was to include the two regional shallow zone remedial action extraction wells for the PVOU (S8 and S12) to intercept contaminated groundwater originating from the former TRW Benchmark site and prevent it from migrating into the downgradient groundwater areas to the north of Puente Creek.

Under a LARWQCB-approved remedial action plan (RAP), dated August 30, 2005, groundwater extraction wells along Valley Boulevard were proposed. In 2006, Northrop Grumman proposed to revise the design of the TRW Benchmark downgradient system into a single extraction network located further downgradient along Nelson Avenue. In 2006, Northrup Grumman installed extraction wells EW1, EW3, and EW4 along Nelson Avenue, and EW2 one block north of Nelson Avenue on the eastern end of Flagstaff Street to approximately 100 feet bgs. However, pipelines and treatment systems were not constructed.

Cleanup of contaminated groundwater downgradient of the TRW Benchmark facility stalled, and in May 2010, lead agency status was transferred from the LARWQCB to EPA and in 2011, EPA issued a Unilateral Administrative Order (UAO) to Northrop Grumman to implement the Remedial Design and Remedial Action for the shallow zone groundwater contamination south of Puente Creek.

In 2012, Northrop Grumman undertook additional field investigations to characterize the extent of groundwater contamination south of Puente Creek. These investigations included vapor intrusion sampling and evaluation, installation of groundwater monitoring wells, and short-term aquifer testing south of Puente Creek and extending back to the former TRW Benchmark source areas.

Design of the Shallow Zone South remedy is underway.

2.3.3. Intermediate Zone

In April 2002, pursuant to the UAO issued by EPA, Northrop Grumman started the remedial design activities for the intermediate zone remedy by submitting the *Compliance, Sentinel and Investigatory Well Network Plan* for the intermediate zone. Between February 2002 and August 2003, Northrup Grumman installed seven single-port and one multiple-port monitoring wells into the intermediate zone. Subsequent analysis of environmental samples collected during and after well development led to an improved conceptual site model of the lateral and vertical extent of Site-related intermediate zone contamination.

Between March and July 2006, Northrop Grumman proposed an intermediate zone groundwater extraction system composed of six extraction wells with a combined design extraction rate ranging

between 1,150 gallons per minute (gpm) and 1,450 gpm. Northrop Grumman installed the six extraction wells between 2006 and 2007.

A consent decree between EPA, California Department of Toxic Substances Control, and Northrop Grumman for performance of remedial design and remedial action was entered in August 2009 superseding the previous UAO.

In July 2009, EPA conditionally approved the *Final Design for the Intermediate Zone Remedy*. In August 2009, Northrop Grumman installed the pipelines for the intermediate zone remedy, and planned to begin construction of the intermediate zone groundwater treatment plant in September 2009. However, as described above, the connection of the pipelines to the storm drain and construction of the treatment plant for the intermediate zone remedy were put on hold due to concerns regarding potential non-compliance with the L.A. County MS4 permit. In July 2009, EPA requested Northrop Grumman to conduct a feasibility study to evaluate additional end use options for the disposal or reuse of treated groundwater. In response, Northrop Grumman submitted a *Feasibility Study Addendum for the PVOU Intermediate Zone Remedy* in May 2010 (EPA, 2011a).

In 2012, as part of the Phase 2 compliance, monitoring, and sentinel well installation program, Northrop Grumman conducted additional groundwater investigation to assess the lateral and vertical extent of the intermediate zone plume. This investigation included the installation of groundwater wells, the collection of groundwater and soil samples, and downhole geophysical logging to evaluate and correlate lithology.

In December 2012, after treated groundwater discharge issues appeared to be resolved for the IZ remedy, Northrop Grumman submitted a revised Pre-Final Design Report. In early 2013, Northrop Grumman notified EPA that this design was no longer viable. After identifying a new water purveyor to accept treated water for distribution, Northrop Grumman began work on the third design for the IZ Remedy in 2014. Northrop Grumman plans to install an additional extraction well, complete the construction of the pipeline system, and construct the treatment facility for the IZ remedy by 2019. Meanwhile, Northrop Grumman has conducted semi-annual groundwater sampling since 2010 and submitted a revised *Compliance/General Monitoring Plan* for the intermediate zone remedy.

The proposed treatment facility will be located in the City of Industry and expected to come online in 2019. Treated groundwater must meet all drinking water standards for planned delivery into the public water supply.

2.4. Operation and Maintenance (O&M)

The only operation and maintenance (O&M) conducted in this five-year review period is routine maintenance of the monitoring and extraction wells.

3. Progress Since the Last Five-Year Review

3.1. Previous Five-Year Review Protectiveness Statement and Issues

The protectiveness statement from the 2011 FYR for the San Gabriel Valley Superfund Site (Area 4) stated the following:

The interim remedy is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

Although potential contaminant migration issues and a potentially complete ecological exposure pathway associated with surface water discharge have been identified, EPA is currently working with the responsible parties to address these issues in the design of the remedy. Once the design is finalized and the remedy is fully constructed and operational, it is anticipated that the remedy will achieve the RAOs and be protective of human health and the environment. Meanwhile, institutional controls (governmental controls) are effectively preventing unacceptable human exposure to contaminated Site groundwater.

The 2011 FYR included two issues and recommendations. Each recommendation and the current status are discussed in Table 3-1.

3.2. Work Completed at the Site During this Five-Year Review Period

Work performed by Carrier/UTC during this five-year review period for the Shallow Zone North Remedial Action is presented in Section 2.3.1.

Work performed by Northrop Grumman during this five-year review period for the Shallow Zone South and Intermediate Zone Remedial Action includes the following:

- Installed groundwater and soil gas monitoring wells, conducted additional site characterization including a large scale aquifer test, updated the PVOU conceptual site model (CSM) and the PVOU numerical groundwater flow model
- Conducted a well survey of potable and non-potable wells within the PVOU
- Conducted semiannual groundwater monitoring
- Purchased a property to construct the planned SZ South and IZ treatment facilities
- Installed an additional pipeline segment in the City of Industry

Groundwater monitoring data are discussed in Section 4.2.1.

Northrop Grumman also conducted sampling to investigate the potential for a vapor intrusion exposure pathway south of Puente Creek within the vicinity of the former TRW Benchmark facility. Samples collected included indoor air, sub-slab soil gas, vadose zone (the area below the surface and above the groundwater level) soil gas, and vadose zone soil. Results from the vapor intrusion sampling are presented in Section 4.2.2.

Table 3-1: Status of Recommendations from the 2011 FYR

| OU # | Issue | Recommendations | Current Status | Current Implementation Status Description | Completion Date (if applicable) |
|-------------|---|--|-----------------------|--|--|
| PVOU | PCE and TCE have been detected at low concentrations below MCLs from two new production wells (B24A and B24B) screened in the deep zone. | Perform close monitoring of these two wells and evaluate the nature and extent of contamination in the deep zone if VOCs continue to be detected in these wells. | Ongoing | In 2013, a deep zone monitoring well was installed near B24A and B24B. EPA received water quality data from SGVWC and DDW that showed detectable levels of contamination in these two production wells, B24A and B24B, would increase when nearby production well B7C was shut down for maintenance. Therefore, pumping from these production wells ceases during maintenance for production well B7C. Since 2015, the nearby production well, B7C, which is screened in both the intermediate zone and deep zone, is no longer active and is slated for destruction. In addition, a downhole investigation of nearby inactive well B8 was conducted and it was determined this well is acting as vertical conduit. Well B8 is slated for destruction. In 2014, a well survey was completed and multiple inactive wells were identified as potential vertical conduits and are now slated for destruction. B24A and B24B are offline pending destruction of B8 and B7C | 9/30/2017 |
| PVOU | Selenium is considered a constituent of potential ecological concern. If discharge to surface water is to be implemented as part of the interim remedy at PVOU, there would be a potentially complete pathway for selenium to reach ecological receptors. | Evaluate and select other end use(s) for the treated groundwater. For surface water discharge of treated groundwater, ARARs for applicable water quality criteria (e.g., selenium), and a full-scale ecological risk assessment should be completed. | Under Discussion | The final end use of treated water for the two shallow zone remedial actions has yet to be approved. Naturally occurring selenium is detected in groundwater above the surface water quality criteria of 5 µg/L established in the California Toxic Rule for freshwater bodies, which must be met if the treatment plant designs include a surface water discharge component. Both shallow zone parties are evaluating reinjection as viable alternative end use to surface water discharge. | 9/30/2017 |

4. Five-Year Review Process

4.1. *Community Notification and Involvement*

EPA plans to publish a public notice of the results of this Five-Year Review in local newspapers and online. The FYR Report will be available at the Site information repositories located at the La Puente Public Library, West Covina Public Library, and Hacienda Heights Public Library. Electronic copies of the FYR Report will be available on EPA Region 9's website.

Error! Hyperlink reference not valid. Over the past five years, EPA has conducted door-to-door construction notifications and regularly notified the residents and business owners of upcoming work activities in the area. Additionally, to disseminate cleanup information and answer questions from the public, EPA prepared fact sheets, held community open houses, and provided project updates to local officials. EPA also holds stakeholder meetings three times a year at the San Gabriel Valley Water Quality Authority's offices in West Covina.

Finally, EPA will continue to engage and inform the community about the investigation and cleanup of the Site and plans to update its 2008 Community Involvement Plan over the next two years.

4.2. *Data Review*

4.2.1. Groundwater

Groundwater monitoring results collected within this five-year review period for the three primary higher permeable groundwater zones within the PVOU: the shallow zone (SZ), intermediate zone (IZ), and the deep zone (DZ) are discussed. Water quality data from production wells screened in the intermediate and deep zones within the PVOU were also reviewed. Results are discussed below and a more detailed discussion is presented in Appendix B.

4.2.1.1 *Shallow Zone*

Depending on location, the shallow zone (SZ), is approximately 50 to 300 feet below ground surface (bgs) and contains the majority of the contaminant mass at the Site. The SZ slopes and thickness to the northwest in the mouth of valley area and is separated from the underlying intermediate zone aquifer by a silt-clay aquitard unit. It is the primary zone of lateral contaminant migration, and serves as a source area for contamination migrating vertically into the intermediate zone. Groundwater flows in the SZ are generally towards the north and northwest at the MOV and Mid-Valley Areas, with hydraulic gradients ranging from 0.0017 to 0.0059 feet/foot.

EPA's evaluation of data collected during semi-annual groundwater sampling in the 2010-2015 period determined that the extent of contamination does not appear to have changed significantly over the five-year period. Figure 4-1 presents an overlay of data collected in 2010 and 2015 of the SZ VOC plumes. The plumes shown are a composite of PCE, TCE, and 1,1,-DCE above the MCL, and 1,4-dioxane above the notification level. Sampling locations were not the same between these events, and direct comparison of plume extents is not possible (a significant number of new monitoring wells were installed south of Puente Creek between 2012-14). However, data collected indicate that the observed location, extent, and

severity of contamination were reasonably similar in these years, and that there is no evidence of significant mobilization of contamination.

The lack of observed mobilization does not indicate that plume migration has not occurred. The extent of the plume is not completely defined to the north (in the downgradient direction) and to the northeast. The plume is also poorly defined where the Mid-Valley Area transitions into the mouth of Puente Valley, where no monitoring wells exist. If mobilization of contaminants were taking place in these areas, particularly in the downgradient direction, it would not be detected by the existing monitoring well network. Additional groundwater sampling in the downgradient direction would improve assessments of plume migration. Based on the current data, it is not clear that whether RAOs (e.g., areas with higher groundwater contamination moving into less contaminated areas) could be evaluated for compliance once the remedial systems are operational.

Table 4-1 presents a summary of contaminant detections in both the shallow zone north of Puente Creek (SZ North) and the shallow zone south of Puente Creek (SZ South). Contaminant concentrations and percentage of wells exceeding ARARs are higher south of Puente Creek. From 2010 to 2015, contaminant levels in shallow zone wells both north and south of Puente Creek generally did not change or were decreasing, based on Mann-Kendall trend analysis. For each contaminant, the number of wells exhibiting increasing trends was less than 10%. A detailed description of contaminant trends is provided in Appendix B.

Table 4-1: Summary of Contaminant Exceedances in the Shallow Zone

| Contaminant | Maximum Detected Concentration (µg/L) | Location of Maximum Detected Concentration | ARAR (µg/L) | Number of Locations Exceeding ARARs | Percentage of Locations Exceeding ARARs |
|--|---------------------------------------|--|-------------|-------------------------------------|---|
| North of Puente Creek, fall 2015 sampling event | | | | | |
| TCE | 310 | S-07 | 5 | 30 | 47% |
| PCE | 63 | SW-04 | 5 | 38 | 59% |
| 1,1-DCE | 800 | MW6-13 | 60 | 17 | 27% |
| 1,4-dioxane | 140 | MW6-13 | 1 | 34 | 53% |
| South of Puente Creek, fall 2015 sampling event | | | | | |
| TCE | 3,300 | W56A | 50 | 77 | 96% |
| PCE | 79 | W34A | 50 | 77 | 96% |
| 1,1-DCE | 8,800 | W34A | 60 | 63 | 80% |
| 1,4-dioxane | 520 | W34A | 30 | 67 | 84% |

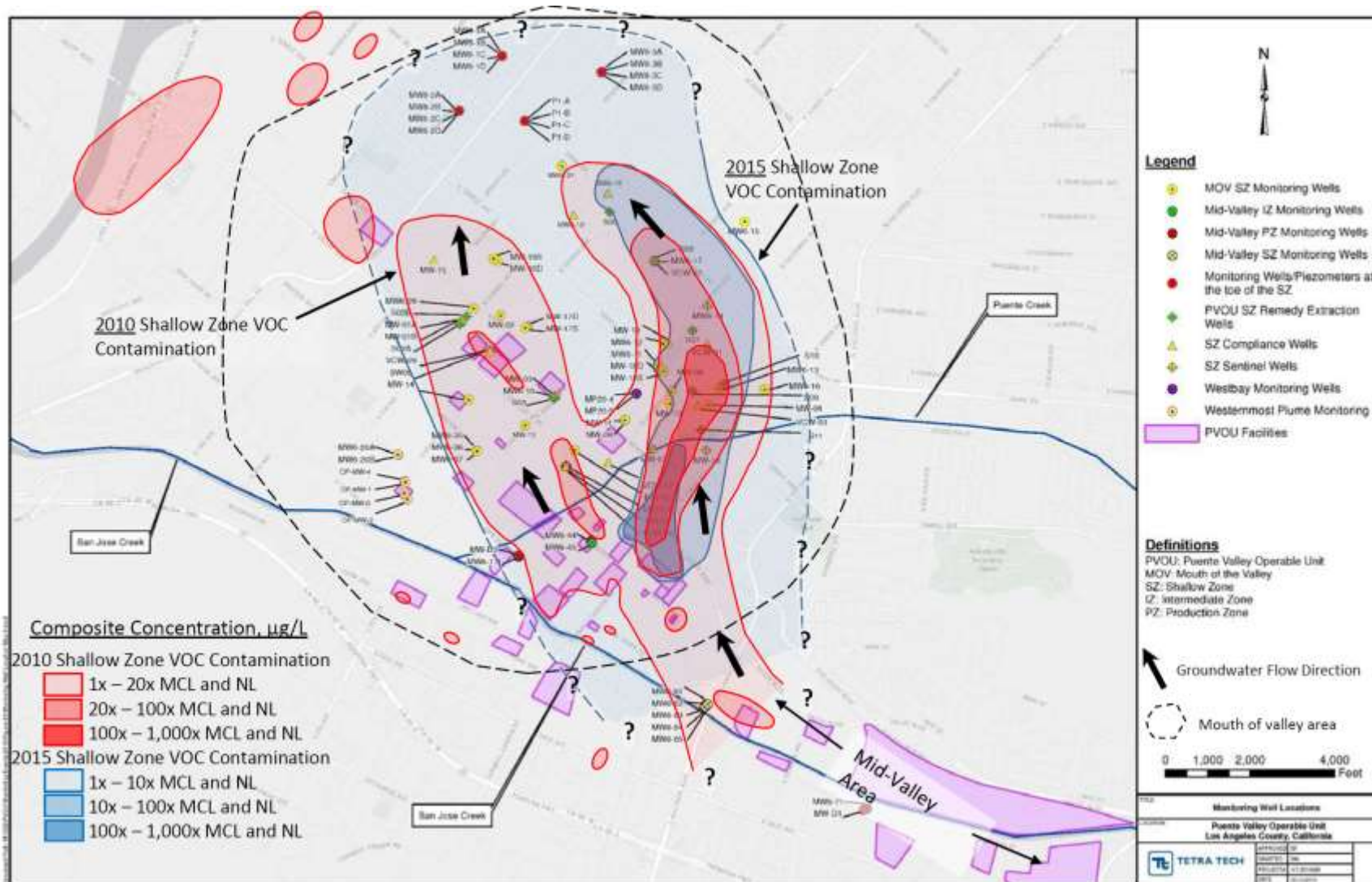


Figure 4-1: Overlay of Observed Shallow Zone Concentrations (2010/2015)

4.2.1.2 Intermediate Zone

Depending on location within the MOV, the intermediate zone includes the water-bearing strata from approximately 100 to 300 feet bgs down to below 500 feet bgs. Although the public water supply wells located at the mouth of Puente Valley are screened primarily in the deep zone, some (two active production wells at present) also extract significant quantities of water from the intermediate zone. As such, prevention of vertical migration of contaminated water into the intermediate zone, and lateral migration of contaminated water within the intermediate zone are identified in the 2005 ESD as performance criteria, and are important to the prevention of public exposure to contaminants.

Table 4-2 presents a summary of contaminant detections exceeding ARARs in the intermediate zone, while Figure 4-2 presents a comparison of the 2010 and 2015 intermediate zone VOC plumes. The plumes are a composite of PCE, TCE, and 1,1-DCE above the MCL, and 1,4-dioxane above the notification level. The inferred limits of the plume in 2015 suggest a possible advancement of contamination in the downgradient direction, but the increased plume extent could also be from the additional sampling data from that area that were available in 2015.

Trend analysis was performed for key intermediate zone COCs, PCE, TCE, 1,1-DCE, and 1,4-dioxane, to determine whether the data indicate an increase or decrease in concentrations over time. Decreasing trends were observed in 14 wells for at least one compound. Increasing trends were observed in six wells for at least one compound. Of the six wells with increasing trends in concentrations, only one, MW6-10i, showed an increasing trend for several compounds including all key COCs. Well MW6-10i is located at the north end of the plume, and increasing trends in this location suggest downgradient migration of contaminants.

Table 4-2: Summary of Contaminant Exceedances in the Intermediate Zone

| Contaminant | Maximum Detected Concentration (µg/L) | Location of Maximum Detected Concentration | ARAR (µg/L) | Number of Locations Exceeding ARAR | Percentage of Locations Exceeding ARAR |
|-------------|---------------------------------------|--|-------------|------------------------------------|--|
| TCE | 120 | W53B | 5 | 71 | 89% |
| PCE | 34 | MW6-46 | 5 | 42 | 57% |
| 1,1-DCE | 140 | W72B | 6 | 21 | 23% |
| 1,4-dioxane | 13 | IZ-East LIZ1 & IZ-East LIZ2 | 3 | 43 | 68% |

Note: Summary of detections of the upper intermediate zone (UIZ) and lower intermediate zone (LIZ) based on the fall 2015 sampling event.

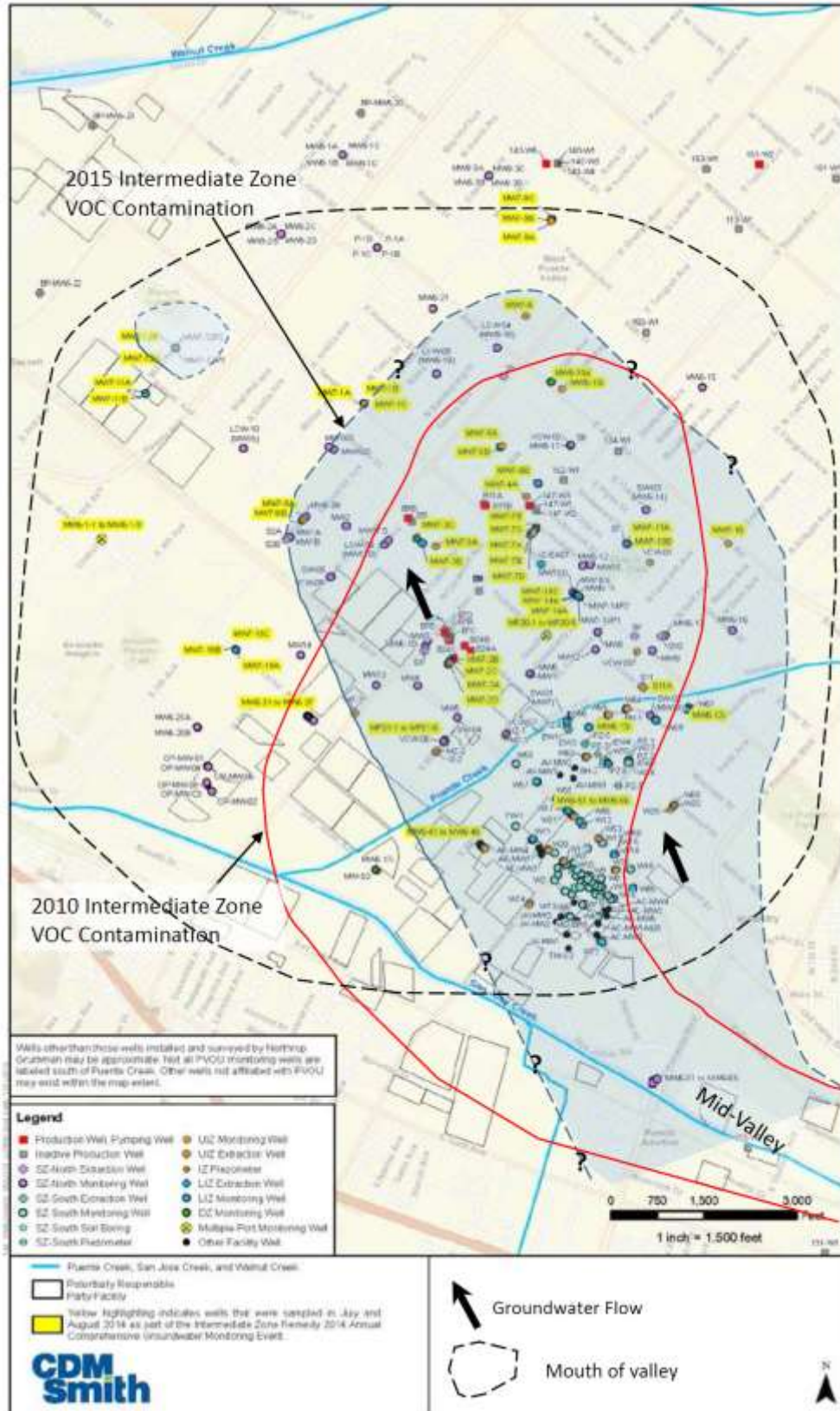


Figure 4-2: Composite Concentration Intermediate Zone VOC Plume Map (2010/2015)

4.2.1.3 *Production wells*

Water supply production wells in the PVOU, operated and owned by San Gabriel Valley Water Company (SGVWC) and Suburban Water Systems (SWS) are the main potential pathway for public exposure to contaminated groundwater at the Site. Monitoring of contaminant levels in these wells is important for the achievement of RAOs. Seven production wells within the B7 Well Field, B7C, B7E, B9B, B11B, B24A, B24B, and 147W3, were in operation and have been sampled within the last five years. Wells B7C, B11B, 147W3 are screened in both the intermediate and deep zones.

Sampling results indicate MCL exceedances of TCE, PCE, and 1,1-DCE in production well B11B and a PCE exceedance at production well B7C. In 2016, SGVWC notified EPA that well B7C, off-line since late 2014, was no longer necessary and that SGVWC planned to decommission and destroy this well in 2016 and prevent this well from acting as a vertical conduit for contaminant migration into cleaner areas. At present, only production wells B11B and 147W3, screened across the intermediate zone, are in operation. Once B7C is destroyed, the only exceedances of MCLs in an active well will be in B11B, which potentially exposes the public to contaminated groundwater. VOCs have been detected below respective MCLs in Well 147W3. However, hexavalent chromium concentrations in production wells B9B, B11B, and 147W3 are just below the State of California MCL of 10 µg/L. At the time of the ESD, there was no MCL for hexavalent chromium; only total chromium (50 µg/L state MCL and 100 µg/L federal MCL). In 2014, California established the MCL for hexavalent chromium of 10 µg/L. Hexavalent chromium concentrations in the SZ have historically ranged from non-detect to 44 µg/L, and in the IZ from non-detect to 31 µg/L.

The 2005 ESD added 1,4-dioxane as a site COC requiring containment. The ARAR for 1,4-dioxane was based on the California notification level at the time. Since then the notification level for 1,4-dioxane has been reduced from 3 µg/L to 1 µg/L. According to the California Water Resource Control Board, Division of Drinking Water (DDW), a recommendation to remove a well out of service occurs when concentrations of a chemical is considerably greater than the notification level. This level is the response level. For 1,4-dioxane, the response level is 35 times the notification level or at 35 µg/L. Only production well B11B has shown a concentration of 1,4-dioxane greater than the notification level. This well does not treat for 1,4 dioxane. Monitoring wells MW6-10i and MW20-03, located upgradient from these production wells, showed increasing trends in 1,4-dioxane concentrations.

Analytical sampling results from well B11B have reported concentrations of Site-related contamination above ARARs since 2002; however, the water purveyor uses an air stripper to remove VOCs to below ARARs prior to further treatment (e.g., chlorination) and distribution into the drinking water supply. There is no treatment for 1,4-dioxane at the B11B plant facility.

Table 4-3: Production Well Influent Sampling Results (2011-15)

| Production Well Designation | TCE (µg/L) | PCE (µg/L) | 1,1-DCE (µg/L) | 1,4-Dioxane (µg/L) | Cr ⁺⁶ (µg/L) | Perchlorate (µg/L) |
|-------------------------------|----------------|----------------|------------------|--------------------|-------------------------|--------------------|
| B7C ¹ | 4.8 | 15.9 | 2.9 | _ ² | 3.5 | ND |
| B7E | ND | ND-1.1 | ND | ND | 3-4.1 | ND |
| B9B | ND | ND | ND | ND | 6.3-8 | ND |
| B11B | 2.2- 33 | 2.0- 33 | 1.9- 50.0 | ND-2.2 | 7.3-8.9 | ND-4.7 |
| 147W3 ² | 1.2 – 3.0 | 0.72-2.3 | 0.73-4.0 | 0.11 – 0.15 | 8.9-9.9 | 1.6 – 3.1 |
| Interim ROD ARAR ³ | 5 | 5 | 6 | 3 ⁴ | _ ⁵ | _ ⁶ |

Sampling results shown for all wells except B7C are minimum and maximum values reported 2011-2015.

Bold indicates greater than Interim ROD standard. Cr⁺⁶ – hexavalent chromium; ND – non-detect

¹ Well recently taken off-line. Data for hexavalent chromium is from May 2011, and other compounds from August and November 2014.

² Sampling results from 2011 - August 2016

³ The interim ROD ARAR.

⁴ The 2005 ESD established an ARAR for 1,4-dioxane based on the California notification level. Since the ESD, the notification level has decreased to 1 µg/L.

⁵ No Interim ROD ARAR for hexavalent chromium. However, the California MCL is 10 µg/L.

⁶ No Interim ROD ARAR for perchlorate. The 2005 ESD established an ARAR for surface water discharge of on treated water of 6 µg/L. The California MCL is 6 µg/L.

Preventing vertical contamination migration is an IROD RAO. Production wells, which are not in operation, can serve as vertical conduits between the hydrostratigraphic zones, and a 2014 well survey conducted by Northrop Grumman identified 15 production wells that could serve as vertical conduits of contaminated groundwater to the deep zone. Of these wells, six are owned by SGVWC, three are owned by SWS, four are owned by private parties, and two had unknown owners.

A separate investigation conducted by Northrop Grumman of another inactive SGVWC production well, B8, located just north of the B7 wells, south of the B11 wells, and upgradient of the B9 wells (Figure 4-2) included groundwater sampling at various depths for VOCs, 1,4-dioxane, and hexavalent chromium. Analytical results for intermediate and deep zone groundwater samples reported concentrations of PCE (37-49 µg/L), TCE (20-30 µg/L), and 1,1-DCE (7.3-16 µg/L) above their respective ARARs (i.e., MCLs) indicating well B8 is acting as a vertical conduit for SZ contamination. To prevent further vertical contamination migration, the California Division of Drinking Water subsequently requested that SGVWC destroy well B8. Additionally, EPA requested SGVWC to complete other investigations of its inactive production wells including B7A, B7B, B9, and B11A. As of the writing of this FYR, well B8 has not been destroyed and investigations for the other inactive wells have not been conducted.

4.2.1.4 Deep Zone

Within the last five years, groundwater samples from deep zone wells report Site-related PCE contamination up to 14 µg/L, including well MW6-62, screened from 315 to 325 feet bgs and located upgradient of the former TRW Benchmark facility. A trend analysis of these PCE concentrations suggest an increasing trend. Additionally, several wells screened in the upper portion of the deep zone and located in the B7 well field area have reported groundwater-sampling results with VOC concentrations ranging from the detection limit up to MCLs.

4.2.2. Vapor Intrusion

From 2012 through April 2016, Northrup Grumman conducted vapor intrusion investigations adjacent to and near the former TRW Benchmark facility. The vapor intrusion work included sampling of vadose zone soil gas, indoor air, and sub-slab soil gas. Indoor air and select sub-slab soil gas sampling was conducted at ten properties with commercial/industrial buildings located south of Valley Boulevard (Figure 4-3). Within the Study Area (Figure 4-3 Vapor Intrusion Study Area) are two parcels containing residential buildings that have not been fully evaluated for vapor intrusion. Appendix B presents detailed information of Site-related vapor intrusion activities.



Figure 4-3: Vapor Intrusion Study Area Map

The 2012 vapor intrusion investigations identified COCs (chloroform, 1,1-dichloroethane [DCA], 1,1-DCE, PCE, 1,1,1-Trichloroethane [TCA], and TCE) to use in evaluating indoor air when ten buildings were initially sampled. The results of the 2012 investigation narrowed the number of affected buildings from ten to five. The investigations in 2013 focused on those five buildings and included sub-slab sampling (sampling of soil gases below the foundation slab-on-grade). Based on the results of the 2013 investigations, three buildings were recommended for additional sampling, where sub-slab concentrations exceeded commercial/industrial air regional screening levels (RSLs) for chloroform, PCE, and TCE. These three buildings were sampled in 2014. Based on the results of the 2014 sampling event, one building (Building 6) was recommended for additional indoor air sampling. In August 2015, Building 6 indoor air was sampled. Results from this sampling event showed that all COCs except chloroform were below commercial/industrial air RSLs. PCE and TCE were detected above the outdoor air concentrations but below RSLs. Additional indoor air sampling was conducted in April 2016, and the results from this event were consistent with previous findings.

There are two parcels containing residential buildings located within the Vapor Intrusion Study Area; one parcel is located immediately adjacent to the north of Building 6 and there are four residential units on this property along Turnbull Canyon Road. To assess the potential of vapor intrusion in these four residential buildings, the August 2015 Building 6 results were compared with the residential air RSLs (Table 4-4). This comparison shows that chloroform, PCE, and TCE indoor air concentrations exceed residential air RSLs. An indoor air investigation for the residential buildings in the vicinity of the former TRW Benchmark facility has not yet been conducted.

Table 4-4: 2015 Indoor Air Results

| Sampling Date | Building | Chloroform (µg/m ³) | 1,1-DCA (µg/m ³) | 1,1-DCE (µg/m ³) | PCE (µg/m ³) | TCE (µg/m ³) | 1,1,2-TCA (µg/m ³) |
|--------------------------------|----------|---------------------------------|------------------------------|------------------------------|--------------------------|--------------------------|--------------------------------|
| Indoor Air Samples | | | | | | | |
| 8/2/2015 | 6A | 1.2 | <0.15 | <0.15 | 0.16 | 0.071 J | <0.50 |
| 8/2/2015 | 6B | 0.66 | <0.15 | <0.15 | 0.32 | 0.059 J | <0.51 |
| 8/2/2015 | 6C | 0.81 | 0.044 J | <0.15 | 0.40 | 0.24 | <0.50 |
| 8/3/2015 | 6D&E | 0.82 | <0.20 | <0.20 | 0.88 | 0.93 | <0.68 |
| 8/3/2015 | 6D&E | 0.80 | <0.15 | <0.14 | 0.85 | 0.86 | <0.49 |
| Outdoor Air Samples | | | | | | | |
| 8/2/2015 | 6 | 0.19 | <0.081 | <0.079 | 0.089 J | 0.027 J | <0.27 |
| Commercial/Industrial Air RSL | | 0.53 | 7.7 | 880 | 47 (2.1) ¹ | 3 | 0.77 |
| Residential Air RSL (Nov 2015) | | 0.12 | 1.8 | 210 | 11 (0.48) ¹ | 0.48 | 0.18 |

Bold – Concentration greater than both commercial/industrial and residential air RSLs.

Italic – Concentration greater than residential air RSL.

µg/m³ – micrograms per cubic meter; < - indicates non-detect above noted reporting limits; J – indicates an estimated value.

¹Value in parenthesis is the January 2016 California Human Health Risk Screening Level.

Note the reporting limit for 1,1,2-TCA is greater than the residential air RSL.

4.3. Site Inspection

Raymond Chavira (EPA), Marlowe Laubach (USACE Seattle District), and consultants for Carrier/UTC and Northrop Grumman conducted the Site inspection on February 18, 2016. The purpose of the inspection was to assess the protectiveness of the remedy. The Site inspection checklist and trip report with photos are included in Appendices F and G.

The participants viewed proposed treatment plant locations, the former TRW Benchmark facility property, and select monitoring, extraction, production well locations within the PVOU. Currently, routine groundwater monitoring is being conducted Site-wide and an in situ field pilot test is underway at the former TRW Benchmark source property.

4.3.1. Shallow Zone North

The proposed SZ North treatment plant location is between two strip malls on a busy street (Amar Road) in the City of La Puente. The groundwater monitoring and extraction wells at this location were locked secured, and in good condition. Some of the extraction wells were located within the parking lanes of sidewalks or in the street. UTC's consultants mentioned that additional work is necessary to connect the extraction wells to the treatment facility (i.e., construct vaults, electrical panels, and pipelines).

4.3.2. Shallow Zone South and the Intermediate Zone

The proposed treatment plant location for both the Shallow Zone South and Intermediate Zone remedies is on a vacant lot located in the City of Industry. IZ extraction wells were generally in good condition, well maintained, and secured. For the SZ South, three extraction wells are located along Nelson Ave. One extraction well, EW-2, is located in a cul-de-sac and like all the SZ South extraction wells, not within a vault like the IZ wells visited; just a manhole. The wellhead cover at EW-2 was secured; however, there was no lock on the well and the cap was loose. An adjacent piezometer, PZ-2, was also viewed. Again, there was no lock on this well and the cap was loose. The consultant made a note to secure these two wells.

4.3.3. Former TRW Benchmark Facility

The former TRW Benchmark facility property is in use by a commercial 200,000 square foot warehouse with loading/unloading zones. Adjacent to the loading/unloading area was the fenced and locked location of the former SVE system. Site inspection participants also noted buildings, and previous indoor air sampling locations.

5. Technical Assessment

5.1. Question A: Is the remedy functioning as intended by the decision documents?

No. The groundwater remedy selected in 1998 Interim ROD, as modified by the 2005 ESD, is not fully constructed nor operational.

Elements of the partially completed remedy include the installation of groundwater monitoring and extraction wells, and conveyance pipeline for portions of the IZ remedy. Design and construction of the extraction well vaults, conveyance pipeline, and treatment facilities have yet to be completed.

Based on EPA's evaluation of groundwater monitoring data collected between 2010 and 2015, the lateral extent of contamination in both the shallow and intermediate zones has not changed significantly; however, plume boundaries are only poorly defined in the north and south edges of the shallow zone plume, and in the north, northwest, and southwest edges of the intermediate zone plume. Reported concentrations of VOCs, hexavalent chromium, and perchlorate in the production wells are below MCLs except at well B11B, where influent PCE and 1,1-DCE exceed MCLs. The B11B production well has an air stripper to treat VOCs; however, the concentrations of 1,4 dioxane at B11B are slightly above the state notification level and there currently is no treatment at B11B for 1,4-dioxane. In addition, there is no treatment for any Site-related constituents at 147W3.

Two production well technical evaluations presented conclusions that Site-related groundwater contamination has affected production wells, and that inactive production wells are providing a conduit for vertical groundwater contamination migration.

5.2. Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives (RAOs) Used at the Time of Remedy Selection Still Valid?

Yes, these are still valid with exceptions discussed below.

A detailed analysis of applicable or relevant and appropriate requirements (ARARs) is presented in Appendix C. A detailed analysis of exposure assumptions and toxicity values is presented in Appendix D.

Changes in Standards and TBCs

Some standards identified in the Interim ROD and ESD have changed. However, these changes have no effect on the protectiveness of the remedy.

Changes in Toxicity and Other Contaminant Characteristics

Toxicity values for some COCs have changed. However, these changes do not affect the protectiveness of the remedy except for 1,1,2-trichloroethane. For this compound, the Interim ROD standard was within the protective cancer risk range but was greater than the non-cancer RSL. The maximum concentrations

detected in the shallow and intermediate zones exceeded the non-cancer RSL. Therefore, the Interim ROD standard may not be protective of non-cancer effects.

Changes in Risk Assessment Methods

In February 2014, the EPA provided supplemental guidance that updated the standard default exposure factors (OSWER Directive 9200.1-120). However, the changes in the recommended default exposure factors do not affect the risk estimates in a way that could affect the protectiveness of the remedy.

Changes in Exposure Pathways

At the time of the Interim ROD, the vapor intrusion pathway was considered to be within the acceptable risk range. However, EPA's understanding of vapor intrusion has changed since then and indoor air sampling in commercial/industrial buildings located near the former TRW Benchmark facility has been conducted. Results from indoor air investigations and other lines of evidence collected indicate that there is a complete VI exposure pathway in one building, although the levels reported were below commercial screening levels. Additionally, four residential units located on a parcel immediately north of this building have not been assessed or sampled for VI. This residential VI investigation (e.g., indoor air sampling) and assessment work is scheduled for 2017 and will take approximately one year to complete.

The other exposure pathways considered in the baseline risk assessment are still valid.

Expected Progress Towards Meeting RAOs

The RAOs identified in the Interim ROD and ESD are still valid. The remedy is still under design and construction; therefore, progress toward achieving the RAOs cannot be evaluated until the groundwater extraction and treatment systems are operational. Production wells SGVWC B11B and SWS 147W3 are intercepting PVOU groundwater contamination. More importantly, SWS 147W3 contaminant levels are approaching drinking water standards. Timely implementation of the remedial action is necessary to contain and reduce contaminant mass near production well 147W3 and achieve the RAO to protect public exposure to contaminated groundwater. Meanwhile, groundwater sampling of well SWS 147W3 is not currently included in the current Sampling and Analysis Plan.

5.3. Question C: Has Any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

Yes. Water levels have been declining in the last five years, and may impede the ability to track contaminant migration and changes in concentrations, and thus may limit the ability to design the shallow zone remedial extraction systems adequately, and which may impact the remedy when it becomes operational.

No other information has come to light that could call into question the protectiveness of the remedy.

6. Issues/Recommendations

Table 6-1: Issues and Recommendations Identified in the Five-Year Review

| Issues and Recommendations Identified in the Five-Year Review: | | | | |
|--|--|--------------------------|------------------------|-----------------------|
| OU(s): Puente Valley | Issue Category: Remedy Performance | | | |
| | Issue: The extraction and treatment systems required in the ROD to achieve groundwater containment and remediation in the shallow and intermediate zones at the mouth of Puente Valley are not constructed. | | | |
| | Recommendation: Complete the design, construction, and commence operation of the groundwater extraction and treatment systems to contain and remediate PVOU COCs. | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Party Responsible | Oversight Party | Milestone Date |
| No | Yes | PRP | EPA | 9/30/2019 |
| OU(s): Puente Valley | Issue Category: Remedy Performance | | | |
| | Issue: Complete vapor intrusion (VI) exposure pathway in one commercial/industrial building near one of the primary VOC contamination source areas - the former TRW Benchmark facility. Residential buildings located near the former TRW Benchmark facility have not been assessed for VI. | | | |
| | Recommendation: Evaluate vapor intrusion pathways for residential buildings located near the former TRW Benchmark facility. | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Party Responsible | Oversight Party | Milestone Date |
| Yes | Yes | PRP | EPA | 9/30/2017 |
| OU(s): Puente Valley | Issue Category: Remedy Performance | | | |
| | Issue: The current sampling and analysis plan does not include groundwater monitoring of production wells within the B7 Well Field impacted by Site-related groundwater contamination. | | | |
| | Recommendation: Revise the sampling and analysis plan to include comprehensive groundwater monitoring of production wells impacted by Site-related groundwater contamination, including SWS 147W3. | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Party Responsible | Oversight Party | Milestone Date |
| No | Yes | PRP | EPA | 3/30/2017 |

| | | | | |
|--------------------------------------|--|--------------------------|------------------------|-----------------------|
| OU(s): Puente Valley | Issue Category: Remedy Performance | | | |
| | Issue: The lateral extent of the plumes for the shallow and intermediate zones is poorly defined where the Mid-Valley Area transitions to the mouth of Puente Valley, particularly on the southwest side of the plume where no monitoring wells exist. | | | |
| | Recommendation: Install additional monitoring wells to better define the extent of groundwater contamination in the shallow zone and intermediate zone. | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Party Responsible | Oversight Party | Milestone Date |
| No | Yes | PRP | EPA | 9/30/2018 |
| OU(s): Puente Valley | Issue Category: Remedy Performance | | | |
| | Issue: Inactive production wells within the B7 Well Field are providing a vertical conduit for contaminant migration | | | |
| | Recommendation: Well owners should properly destroy any inactive production well(s) providing a vertical conduit for contaminant migration | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Party Responsible | Oversight Party | Milestone Date |
| No | Yes | Other | EPA | 9/30/2017 |
| OU(s): Puente Valley | Issue Category: Remedy Performance | | | |
| | Issue: Hexavalent chromium continues to be detected in shallow zone and intermediate groundwater monitoring wells and in production wells within the B7 Well Field. The IROD did not include hexavalent chromium as a contaminant of concern or select an ARAR for hexavalent chromium. | | | |
| | Recommendation: Evaluate detections of hexavalent chromium relative to the remedial action objectives to prevent exposure of the public to contaminated water i.e., protection of production wells, and to reduce the impact of continued contaminant migration on water supply wells | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Party Responsible | Oversight Party | Milestone Date |
| No | Yes | EPA | EPA | 9/30/2018 |

*Vapor intrusion studies for the commercial/industrial buildings in the vicinity of the former TRW Benchmark facility indicate that there is a potential for vapor intrusion in one building that is immediately adjacent to residential buildings. Therefore, there may be a current exposure in the residential buildings. No sampling of residential building indoor air has occurred, so current exposure cannot be verified.

6.1. Other Findings

In addition, the following are recommendations that improve performance of the remedy, but do not affect current and/or future protectiveness and were identified during the FYR:

- Ensure that all wells are locked.
- In comparing the indoor air sampling results with residential air RSLs, it was observed that several reporting limits were greater than residential air RSLs. When residential properties are evaluated for vapor intrusion, ensure that the reporting limits are less than the residential RSL.
- Continue to monitor for hexavalent chromium. Currently concentrations in the shallow and intermediate zone range from non-detect to above the current California MCL in groundwater monitoring wells and just at or below the California MCL at active production wells.

7. Protectiveness Statement

Table 7-1: Protectiveness Statement

| Protectiveness Statement(s) | | |
|---|---|---|
| <i>Operable Unit:</i> Puente Valley | <i>Protectiveness Determination:</i> Protectiveness Deferred | <i>Planned Addendum Completion Date:</i> 9/30/2017 |
| <i>Protectiveness Statement:</i> A protectiveness determination of the remedy at San Gabriel Valley, Area 4, cannot be made at this time until further information is obtained. Further information will be obtained by completing the additional vapor intrusion investigation and assessment. It is expected that this action will take approximately one year to complete, at which time a protectiveness determination will be made. Meanwhile, exposure pathways presenting unacceptable risks from contaminated groundwater are controlled. Further, in order for the remedy to be protective in the long-term, the following actions are required: (1) Design, construct, and operate groundwater remedial systems to meet RAOs; (2) Evaluate vapor intrusion pathways for residential buildings located near the former TRW Benchmark facility (3) Revise the Sampling and Analysis Plan to include groundwater monitoring of production wells impacted by Site-related groundwater contamination, including, SWS 147W3; (4) Install additional monitoring wells to better define the extent of groundwater contamination in the shallow zone and intermediate zone; (5) Properly destroy any inactive water production well(s) providing a vertical conduit for Site-related groundwater contamination migration; and, (6) Evaluate detections of hexavalent chromium relative to remedial action objectives to prevent exposure of the public to contaminated groundwater i.e., protection of production wells, and and to reduce the impact of continued contaminant migration on water supply wells. | | |

8. Next Review

The next five-year review report for the San Gabriel Valley Superfund Site (Area 4) is required five years from the completion date of this review.

Appendix A: List of Documents Reviewed

List of Documents Reviewed

- CDM, 1997. Interim RI/FS, Final Remedial Investigation Report, Puente Valley Operable Unit. 30 May.
- CDM Smith, 2014a. Final Assessment Report, San Gabriel Valley Water Company Well B8, Prepared for: Northrup Grumman Systems Corporation. November 14, 2014.
- CDM Smith, 2014b. 2014 Annual Comprehensive Groundwater Monitoring Report PVOU Intermediate Zone, Prepared for: Northrop Grumman Systems Corporation. November 12, 2014.
- CH2M HILL, 1997. Puente Valley Operable Unit Interim RI/FS, Feasibility Study. May 1997.
- EPA, 1998. Interim Record of Decision. San Gabriel Valley Superfund Site. Puente Valley Operable Unit. September 1998.
- EPA. 2005. Explanation of Significant Differences to the 1998 Interim Record of Decision, Puente Valley Operable Unit.
- EPA, 2006. Consent Decree. USEPA, CV-05-6022 ABC (FM0x) (United States District, Central District of California, Western Division April 7, 2006).
- EPA, 2011a. Final Five-Year Review Report, First Five-Year Review Report for San Gabriel Valley Superfund Site (Area 4), Puente Valley Operable Unit. March 2011.
- EPA, 2011b. Unilateral Administrative Order for Remedial Design and Remedial Action, CERCLA Docket No. 2011-14. September 11, 2013.
- EPA, 2014a. United States Environmental Protection Agency. Letter from EPA to Main San Gabriel Basin Watermaster regarding comments to Section 28(e) Permit for New San Gabriel Well 24C and Planned Protection of Drinking Water Source Areas. July 24, 2014.
- EPA, 2014b. Email correspondence from Ray Chavira to Klaus Rohwer. October 28, 2014
- Geosyntec, 2013. Geosyntec Consultants. Indoor Air Sampling Report, Shallow Zone South of Puente Creek, Puente Valley OU, Phase 1, Benchmark Site Study Area. March 29, 2013.
- Geosyntec, 2014. Memorandum, Potential Conduit Wells, Puente Valley Operable Unit. September 15, 2014.
- Geosyntec, 2015a. Addendum #2 – Indoor Air and Sub-Slab Soil Vapor Sampling Report. February 27, 2015.
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- Geosyntec, 2015b. Shallow Zone South of Puente Creek Interim Remedy, Puente Valley OU, Field Sampling Plan for Indoor Air Monitoring in Building 6. July 7, 2015
- Geosyntec, 2015c. Summer 2015 Indoor Air Monitoring Report, Shallow Zone South of Puente Creek, Puente Valley OU. October 30, 2015
- GES, 2016a. Groundwater & Environmental Services, Inc. 2015 Comprehensive Groundwater Monitoring Report Intermediate Zone Puente Valley Operable Unit, Prepared for: Northrup Grumman Systems Corporation. February 2016.
- GES, 2016b. 2015 Annual Comprehensive Groundwater Monitoring Report Mouth of the Valley Shallow Zone South of Puente Creek (SZ-South), September/October 2015. Prepared for: Northrup Grumman Systems Corporation. January 2016.
- LGC, 2014. Lewis Groundwater Consulting. Technical Data Summary Shallow Zone and Intermediate Zone Puente Valley Operable Unit. March 31, 2014.
- Northrop Grumman Systems Corporation, 2014. Shallow Zone-South and Intermediate Zone, Puente Valley OU. March 2014.
- Orion, 2012. Orion Environmental, Inc. Final Remedial Design Investigation Work Plan, Shallow Zone South of Puente Creek, Puente Valley OU. December 2012.
- Orion, 2014. Orion Environmental Inc. 2014 Annual Comprehensive Groundwater Monitoring Report, PVOU Shallow Zone, South of Puente Creek (SZ-South), August/September 2014. Prepared for: Northrup Grumman Systems Corporation. November 2014.
- MSGBW, 2015. Main San Gabriel Basin Watermaster. Five-Year Water Quality and Supply Plan 2015-2020. November 2015.
- Tetra Tech, 2014. Annual Comprehensive Groundwater Monitoring Report Puente Valley Operable Unit Shallow Zone North Remedy San Gabriel Valley Superfund Site Area 4. December 3, 2014.
- Tetra Tech, 2016. 2015 Annual Comprehensive Groundwater Monitoring Report Puente Valley Operable Unit Shallow Zone North Remedy San Gabriel Valley Superfund Site Area 4. February 24, 2016.
- WQA, 2015. San Gabriel Basin Water Quality Authority. Semi-Annual Status Report, Prepared Pursuant to Ch. 404/Statutes of 2007. September 16, 2015.

Appendix B: Data Review

Data Review

GROUNDWATER

A data review typically assesses the effectiveness of the remedies of a site as part of the Five-Year Review. This data review will assess the changes in groundwater contaminants from 2010 to 2015. The data reviewed is based on available semi-annual groundwater monitoring reports from 2013 to 2016.

BACKGROUND

The U.S. Environmental Protection Agency (EPA) issued an Interim Record of Decision (ROD) for the PVOU in September 1998. The Interim ROD selected migration control of groundwater contaminants of concern (COCs) in the shallow zone (SZ) and the intermediate zone (IZ) at the mouth of Puente Valley (MOV) as the most appropriate remedy (EPA, 1998). The location of the MOV is shown in Figure 1-1. Volatile organic compounds (VOCs) are the primary contaminants, with tetrachloroethene (PCE), trichloroethylene (TCE), and 1,1-dichloroethene (DCE) comprising the most commonly detected contaminants. Groundwater contamination was also found to occur primarily in the shallow and intermediate zones of the PVOU aquifer. Two additional contaminants were added under the 2005 Explanation of Significant Differences (ESD): 1,4-dioxane and perchlorate.

The remedial action will be designed to prevent groundwater in the shallow zone with VOC contamination at or above Interim ROD performance criteria from migrating beyond its current lateral and vertical extent. Performance criteria for the shallow zone are defined in the Interim ROD as ten times ARARs; in the intermediate zone performance criteria are set equal to ARARs. Performance criteria apply to the treatment system, and are not cleanup levels for the remedy as a whole.

The remedial action will also be designed to provide sufficient hydraulic control to prevent groundwater in the intermediate zone with VOC contamination above the Interim ROD ARARs from migrating beyond the B7 Well Field Area. The B7 Well Field Area is defined as the area encompassed by the production/pumping wells shown in Figure 1-1 (red squares), plus the downgradient extent of contamination at or above applicable or relevant and appropriate requirements (ARARs) in the intermediate zone.

The remedy also includes a set of wells for monitoring groundwater in the shallow (approximately 150 wells), intermediate (approximately 105 wells), and deep zones (approximately 23 wells) at the Mid-Valley Area and the MOV. Compliance with the performance criteria will be confirmed by quarterly sampling of the compliance wells upon system startup.

The treatment systems are being designed and end use alternatives for the remedy are currently under consideration. The treatment systems consist of three major parts: the intermediate zone (IZ) remedy, the shallow zone north (or SZ North) remedy, and the shallow zone south (or SZ South) remedy. Northrop Grumman Corporation (NGC) is responsible for the intermediate zone and shallow zone south cleanup systems, and Carrier/United Technology Corporation (UTC) is responsible for the shallow zone north cleanup systems. NGC has partially completed installation of extraction wells and pipelines for the intermediate zone remedy and construction of the water treatment plant is expected in 2018. Carrier/UTC has completed installation of extraction wells and will be conducting additional field activities in 2017 related to reinjection as part of the Shallow Zone North remedy. NGC has completed field investigations for the shallow zone south and is now in remedial design. Installation of extraction wells and associated pipelines, and construction of the Shallow Zone South treatment plant system will begin as soon as designs are completed.

MAJOR AQUIFER ZONES

Three primary relatively higher permeable groundwater zones within the PVOU were identified during the PVOU Remedial Investigation/Feasibility Study (CDM, 1997 and CH2M HILL, 1997) and further refined following investigations conducted during 2005-2015 (REFERENCE). These groundwater zones are informally referred to as the shallow zone (SZ), intermediate zone (IZ), and production zone (PZ) also referred to as deep zone (DZ). Aquifer materials include relatively coarse-grained sediments including silts, sands, and gravels deposited primarily by braided streams. Relatively fine-grained lower permeability zones dominated by silt and clay separate the more permeable zones; they are laterally continuous and act as aquitards. The thickness of all units (especially the aquifers) increases and their material coarsens to the north toward the main San Gabriel basin; the units are undifferentiated in the San Gabriel basin. All units thin out to the southeast and are undifferentiated in the easternmost portion of Puente Valley. The aquifer and aquitard units in the MOV area have been identified during 2005-2015 based on lithologic and geophysical logs, water levels, hydraulic responses in wells, and groundwater quality.

As defined in the Interim ROD, the shallow zone in the MOV generally encompasses the upper 150 to 200 feet of the saturated aquifer to approximately 300 feet below ground surface (bgs); the depth to the bottom of the shallow zone increases to the northwest. The shallow zone includes fine grained units; one of these units is used to further divide this aquifer into upper and lower shallow zone (SZ1 and SZ2). The shallow zone does not extend below the depths of the top of perforated intervals of San Gabriel Valley Water Company (SGVWC) production wells B7C and B11B (280 and 302 feet bgs, respectively), and Suburban Water Systems (SWS) production well 147W3 (300 feet bgs). The majority of the contaminant mass at the MOV is migrating within the shallow zone. However, there is a downward hydraulic gradient in the area and some contaminant mass is migrating downward and into the intermediate zone, particularly in the southeastern portion of the MOV area.

The intermediate zone includes the water-bearing strata in the interval between the shallow zone and the deep zone. Laterally continuous aquitard unit referred to as Galaxy Clay forms the boundary between the shallow and intermediate zones. Two units have been delineated within the intermediate zone; these are the upper intermediate zone (UIZ) and lower intermediate zone (LIZ). The lower intermediate zone has also been divided into the upper and lower portions (LIZ1 and LIZ2, respectively). Several production wells at the MOV produce water from the intermediate zone (e.g., SGVWC production wells B7C and B11B and SWS production well 147W3; at present, only B11B and 147W3 operate). Consequently the intermediate zone is characterized by a lower water elevation than the shallow zone.

The deep zone is used for groundwater production. In general, at the MOV, the production zone extends from a depth of approximately 400 to 1,300 feet bgs. Several production wells screened in the DZ currently operate at the MOV. Because of the production pumping from the DZ, water elevations are lower in the DZ than in the shallow and intermediate zones.

SHALLOW ZONE

Groundwater Occurrence

Water levels in the shallow zone have been gradually declining since the late 1990s, despite temporary recoveries in 2005-2006 and 2012. The water levels also fluctuate on an annual basis, typically up to about ten feet, with highs usually occurring in the mid- to late-spring and lows usually occurring in the early fall. In unusually wet years such as 2005, water levels in the PVOU shallow zone may fluctuate by as much as 20 to 25 feet over the course of the year. In unusually dry years such as 2015, water levels in the PVOU shallow zone have declined by up to five feet per year. During the fall 2015 groundwater monitoring and sampling events, 21 of 90 (Shallow Zone North) and 11 of 93 (Shallow Zone South) monitoring wells scheduled to be sampled were dry due to declining water levels. Piezometric levels have been steadily declining in the PVOU since January 2012. Groundwater elevation contour maps indicate that groundwater flows generally towards the north and northwest at the MOV and towards the west-northwest in the Mid-Valley Areas. Flow gradients have been 0.0017 to 0.0059 feet/foot in the shallow zone.

Contaminant Distributions and Trends

Figure 1-2 presents an overlay of data collected in 2010 and 2015 to characterize the shallow zone VOC plume. The plumes shown are a composite of PCE, TCE, and 1,1-DCE above the MCL, and 1,4-dioxane above the notification level. Although sampling locations were not the same in 2010 and 2015 (more wells were installed after 2010 and some shallow wells became dry), and comparison of plume extent in those years is approximate, the data indicate no evidence of significant spreading of the contaminant plume. See Figure B-2 for a comparison of the 2010 and 2015 plumes.

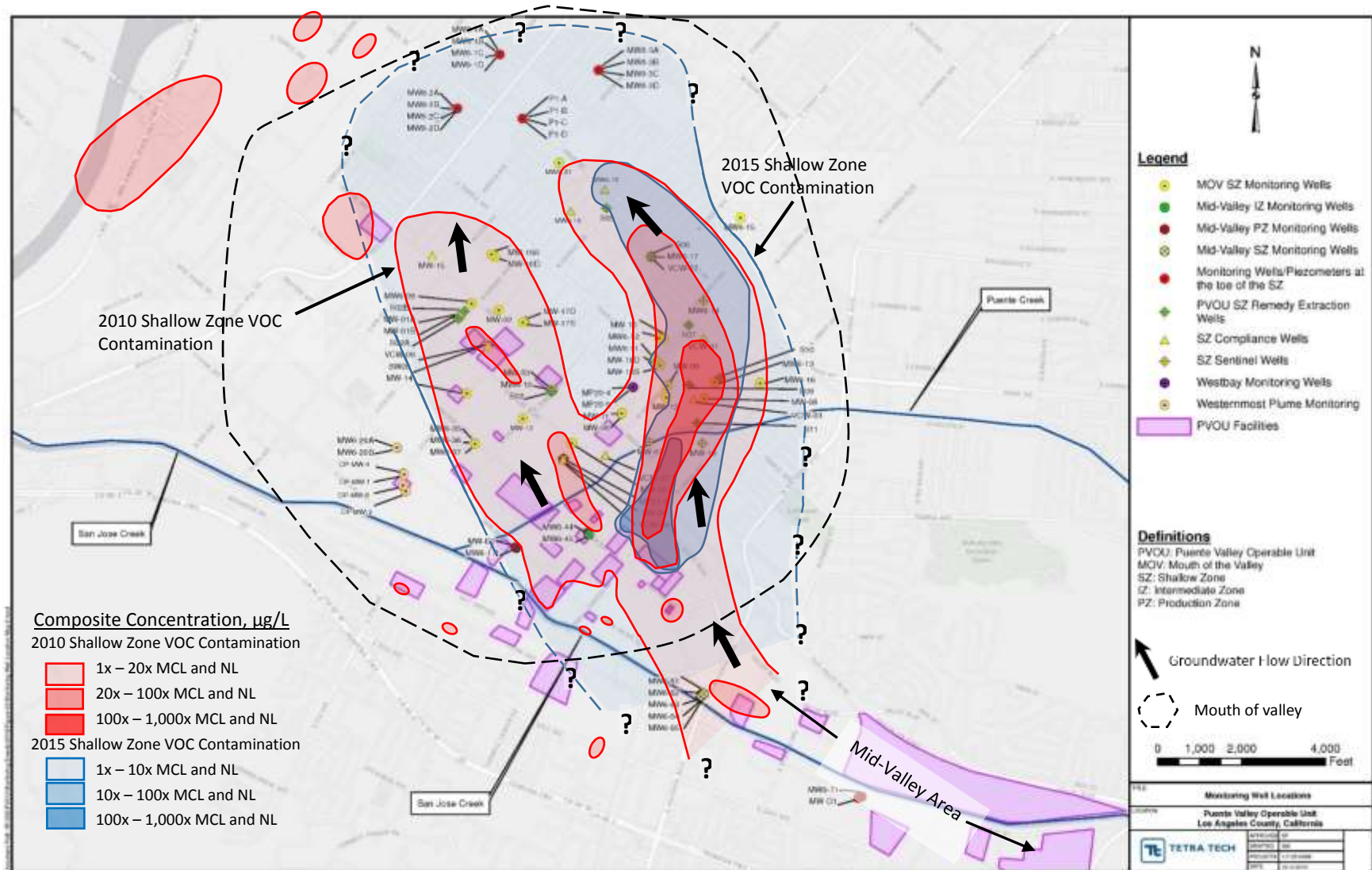


Figure 1-2: VOC Plume Overlay Map - Shallow Zone (2010/2015). Plumes represent observed concentrations greater than MCLs and notification levels. Dashed where estimated. 2010 plume data from EPA, 2011. 2015 plume data and groundwater flow directions from Tetra Tech, 2016 and Orion, 2014.

Trend analyses were performed by the PRPs' contractors on eight contaminants, including TCE, PCE, 1,1-DCE, and 1,4-dioxane on each of 65 to 70 groundwater monitoring wells, and on 9 extraction wells in the shallow zone north network (Tetra Tech, 2016) and on 83 monitoring wells in the shallow zone south network (GES, 2016). The analyses were performed using the Mann-Kendall statistical trends analysis.

Table B-1 and **Table B-** summarize the trend analyses for the shallow zone north and shallow zone south, respectively.

Table B-1: Summary of Contaminant Trends in the Shallow Zone North

| Contaminant of Concern | Total Wells Analyzed | Increasing | Decreasing or No Significant Trend | Insufficient Data |
|----------------------------|----------------------|------------|------------------------------------|-------------------|
| TCE | 78 | 1 | 77 | 1 |
| PCE | 78 | 6 | 72 | 1 |
| 1,1-DCE | 78 | 3 | 75 | 1 |
| 1,4-Dioxane | 72 | 6 | 66 | 6 |
| Cr ⁺⁶⁽¹⁾ | 69 | 6 | 63 | 5 |
| Perchlorate ⁽²⁾ | 68 | 3 | 65 | 11 |

Note: Insufficient data not counted for total wells analyzed. Cr⁺⁶ = hexavalent chromium

1 – There is no performance criteria for hexavalent chromium in the interim ROD or the 2005 ESD. However, hexavalent chromium is present at levels greater than the current MCL (10 µg/L).

2 – There is no performance criteria for perchlorate in the interim ROD. The 2005 ROD discusses perchlorate as an emerging contaminant and established a surface water discharge standard for treated water.

Table B-2: Summary of Contaminant Trends in the Shallow Zone South

| Contaminant of Concern | Total Wells Analyzed | Increasing | Decreasing | No Significant Trend | Insufficient Data |
|----------------------------|-----------------------------|------------|------------|----------------------|-------------------|
| TCE | 83 | 1 | 19 | 63 | 4 |
| PCE | 83 | 4 | 19 | 60 | 4 |
| 1,1-DCE | 82 | 2 | 20 | 60 | 4 |
| 1,4-Dioxane | 81 | 4 | 11 | 66 | 4 |
| Cr ⁺⁶⁽¹⁾ | 73 | 8 | 3 | 62 | 4 |
| Perchlorate ⁽²⁾ | no trend analysis performed | | | | |

Note: Insufficient data not counted for total wells analyzed. Cr⁺⁶ = hexavalent chromium

1 – There is no performance criteria for hexavalent chromium in the interim ROD or the 2005 ESD. However, hexavalent chromium is present at levels greater than the current MCL (10 µg/L).

2 – There is no performance criteria for perchlorate in the interim ROD. The 2005 ROD discusses perchlorate as an emerging contaminant and established a surface water discharge standard for treated water.

INTERMEDIATE ZONE AND DEEP ZONE

Groundwater Flow

Hydrographs for the monitoring wells show that piezometric levels have been declining in the PVOU since January 2012. The piezometric heads are influenced by production pumping from the B7 well field; the pumping effect increases with depth.

The horizontal groundwater gradients were estimated as follows:

- UIZ – The horizontal gradient is 0.01 with a north-northwest to northwest flow direction.
- LIZ1 – The horizontal gradient is variable ranging from 0.002 to 0.02 with a northwest flow direction.
- LIZ2 – The horizontal gradient is affected by production well pumping and ranges from 0.01 to 0.03 with direction toward the B7 well field.
- DZ – The horizontal gradient is 0.02 with a northwest flow direction south of Puente Creek and 0.001 with a north-northwest flow direction north of Puente Creek. These gradients are representative of the uppermost portion of the deep zone where PVOU monitoring wells are screened.

In 2015, a downward vertical gradient was generally present between the upper intermediate zone, lower intermediate zone, and deep zone. Some well clusters that showed seasonal upward gradients were likely influenced by nearby production wells.

Contaminant Distributions and Trends

The key constituents for the intermediate zone remedy are PCE, TCE, 1,1-DCE, and 1,4-dioxane. VOC contaminants are widely distributed within the upper intermediate zone. PCE, TCE, and 1,4-dioxane are present throughout the upper intermediate zone at concentrations exceeding MCLs or notification levels, whereas higher concentrations of 1,1-DCE and 1,4-dioxane, and the more elevated levels of TCE and PCE are found downgradient of the former TRW Benchmark site. In the lower intermediate zone, contamination is more discontinuous and detections tend to be more isolated. PCE and TCE are the principal contaminants in most wells in the lower intermediate zone aquifers.

n-Nitrosodimethylamine (NDMA) and 1,2,3-trichloropropane (TCP) were also detected in multiple wells. 1,1-DCE is the predominant contaminant at several wells screened in the upper intermediate zone, located mid plume.

Trend analysis was conducted by NGC on all intermediate zone wells to determine whether the data indicate an increase or decrease in concentrations over time. Trend analysis was performed using the Mann-Kendall statistical trends analysis for PCE, TCE, 1,1-DCE, and 1,4-dioxane in the upper and lower intermediate zones using available historical concentrations from intermediate zone wells through the 2015 sampling events. Table B-3 provides a summary of the trends in the intermediate zone.

Table B-3: Summary of Contaminant Trends in the Intermediate Zone

| Contaminant of Concern | Total Wells Analyzed | Increasing | Decreasing | No Significant Trend | Insufficient Data |
|------------------------|----------------------|------------|------------|----------------------|-------------------|
| TCE | 85 | 4 | 12 | 69 | 6 |
| PCE | 79 | 3 | 12 | 64 | 6 |
| 1,1-DCE | 62 | 3 | 10 | 49 | 6 |
| 1,4-Dioxane | 68 | 9 | 3 | 56 | 6 |

Note: The summary represents the combined aquifers of the intermediate zone (upper [UIZ] and lower [LIZ]). Insufficient data not counted for total wells analyzed.

In the trend analysis, 6 wells indicated an increasing trend for at least one compound and 14 wells had a decreasing trend for at least one compound. The majority of the results show no significant trend. Out of the six wells that had increasing trends, only MW6-10i, located on the north end of the plume, showed an increasing trend for several compounds including PCE, TCE, 1,1-DCE, 1,4-dioxane, and 1,1-DCA. MP20-03, located just north of Puente Creek in the middle of the plume, continued to show an increasing trend for 1,4-dioxane. Decreasing trends were observed for PCE at four wells, TCE at five wells, 1,1-DCE at six wells, and 1,4-dioxane at one well. The locations of these wells are shown on Figure B-1.

In general, the majority of wells with sufficient data to perform a trend analysis showed no significant trend. For the wells that did show a significant trend, the majority showed a decreasing trend for all compounds included in the trend analyses.

Figure B-1 presents a comparison of the 2010 and 2015 intermediate zone VOC plumes. The plumes are a composite of PCE, TCE and 1,1-DCE above the MCL, and 1,4-dioxane above the notification level. The figure for the composite plumes indicates that the groundwater contaminants have mobilized very little over the past five years. However, the limits of the plume are poorly defined, particularly in the downgradient direction to the north and to the northeast. The plume is also poorly defined where the Mid-Valley Area transitions into the MOV area, particularly on the southwest side of the plume where no monitoring wells apparently exist.

DEEP ZONE

In the deep zone, only well MW6-62, screened from 315 to 325 feet bgs and located upgradient of the former TRW Benchmark facility, has had an exceedance above the MCL (for PCE). The trend analysis indicated an increasing trend for PCE concentrations in monitoring well MW6-62. The PCE concentrations, which ranged from 8.6 µg/L to 14 µg/L over the past five years, exceed the MCL of 5 µg/L. Well MW6-61, part of a well cluster with MW6-62, represents the deepest zone and is screened from 446 to 456 feet bgs. Well MW6-61 has had no detections.

PRODUCTION WELLS

Water supply production wells in the PVOU, operated and owned by San Gabriel Valley Water Company (SGVWC) and Suburban Water Systems (SWS), are the main potential pathway for public exposure to contaminated groundwater at the Site. Monitoring of contaminant levels in these wells is important for the achievement of RAOs. Seven production wells, B7C, B7E, B9B, B11B, B24A, B24B and 147W3, were in operation and have been sampled within the last five years (Table B-4). Wells B7C, B11B, 147W3 are screened in both the intermediate and deep zones.

Sampling results provided by DDW indicated MCL exceedances of TCE, PCE, and 1,1-DCE in production well B11B and a PCE exceedance at production well B7C. In 2016, SGVWC notified EPA that well B7C is planned for destruction (well B7C was off-line since late 2014). At present, only production wells B11B and 147W3 screened across the intermediate zone are in operation. Once B7C is destroyed, the only exceedances in an active well will be in B11B, which potentially exposes the public to contaminated groundwater. Hexavalent chromium concentrations in production wells B9B, B11B, and 147W3 were just below the State MCL of 10 µg/L. At the time of the ESD, there was no MCL for hexavalent chromium; only total chromium (50 µg/L state MCL and 100 µg/L federal MCL). In 2014,

California established the MCL for hexavalent chromium of 10 µg/L. Hexavalent chromium concentrations in the shallow zone ranged from non-detect to 44 µg/L and in the intermediate zone ranging from non-detect to 31 µg/L.

The 2005 ESD added 1,4-dioxane as a site COC requiring containment. The ARAR for 1,4-dioxane was based on the California notification level at the time. Since then the notification level for 1,4-dioxane has been reduced from 3 µg/L to 1 µg/L. According to the California Water Resource Control Board, Division of Drinking Water (DDW), a recommendation to remove a well out of service occurs when concentrations of a chemical is considerably greater than the notification level. This level is the response level. For 1,4-dioxane, the response level is 35 times the notification level or at 35 µg/L. Only production well B11B has shown a concentration of 1,4-dioxane greater than the notification level. This well does not treat for 1,4 dioxane. Monitoring wells MW6-10i and MW20-03, located upgradient from these production wells, showed increasing trends in 1,4-dioxane concentrations.

Table B-4: Production Well Sampling Results (2011-15)

| Production Well Designation | TCE (µg/L) | PCE (µg/L) | 1,1-DCE (µg/L) | 1,4-Dioxane (µg/L) | Cr ⁺⁶ (µg/L) | Perchlorate (µg/L) |
|-------------------------------|----------------|----------------|------------------|--------------------|-------------------------|--------------------|
| B7C ¹ | 4.8 | 15.9 | 2.9 | – ² | 3.5 | ND |
| B7E | ND | ND-1.1 | ND | ND | 3-4.1 | ND |
| B9B | ND | ND | ND | ND | 6.3-8 | ND |
| B11B | 2.2- 33 | 2.0- 33 | 1.9- 50.0 | ND-2.2 | 7.3-8.9 | ND-4.7 |
| 147W3 ² | 1.2 – 3.0 | 0.72-2.3 | 0.73-4.0 | 0.11 – 0.15 | 8.9-9.9 | 1.6 – 3.1 |
| Interim ROD ARAR ³ | 5 | 5 | 6 | 3 ⁴ | – ⁵ | – ⁶ |

Sampling results shown for all wells except B7C are minimum and maximum values reported 2011-2015.

Bold indicates greater than Interim ROD standard. Cr⁺⁶ – hexavalent chromium; ND – non-detect

¹ Well recently taken off-line. Data for hexavalent chromium is from May 2011, and other compounds from August and November 2014.

² Sampling results from 2011 - August 2016

³ The interim ROD ARAR.

⁴ The 2005 ESD established an ARAR for 1,4-dioxane based on the California notification level. Since the ESD, the notification level has decreased to 1 µg/L.

⁵ No Interim ROD ARAR for hexavalent chromium. However, the California MCL is 10 µg/L.

⁶ No Interim ROD ARAR for perchlorate. The 2005 ESD established an ARAR for surface water discharge of on treated water of 6 µg/L. The California MCL is 6 µg/L.

Sampling results from B11B after the air stripper show that VOC MCLs are being met prior to being distributed into the drinking water system. There is no treatment for 1,4-dioxane at the B11B plant facility.

In 2014, Northrop Grumman conducted a well survey to identify groundwater production and oil and gas wells located within the PVOU with screen intervals that could serve as potential vertical conduits between the hydrostratigraphic zones. To determine whether these wells would be considered potential vertical conduits, six conditions were identified as presented below.

- The well is known to be a currently active water supply well
- The well is known to be a monitoring well

- The well is located outside of the shallow zone plume extent (defined as within the MCL contour line; see Figure 1-2)
- The total well depth and/or screen intervals indicates the well does not extend deeper than the shallow zone
- The well is known to be screened only in the deep zone
- Records indicate the well has been destroyed

If these six conditions were not met, then those wells were considered potential vertical conduits. Based on the evaluation performed, 15 wells were identified that could act as conduits from shallow groundwater to deeper aquifer units (Figure 8-3). Of these wells, six are owned by SGVWC, three are owned by SWS, four are owned by private parties, and two had unknown owners (Geosyntec, 2014a).

Northrop Grumman also conducted a downhole investigation of production well B8, owned by SGVWC but not in use (inactive), between July and September 2014 to determine whether this well provides a vertical conduit for contamination. This well is located just north of the B7 wells, south of the B11 wells, and upgradient of the B9 wells (Figure 1-4) and is screened in each of the hydrostratigraphic zones. The investigation included a video of the down-hole condition of the well, temperature and spinner logs to document inflow and outflow zones and quantify flow in the well, and chemical analysis on seven samples collected at various depths for VOCs, 1,4-dioxane, hexavalent chromium, nitrates/nitrites, and total dissolved solids.

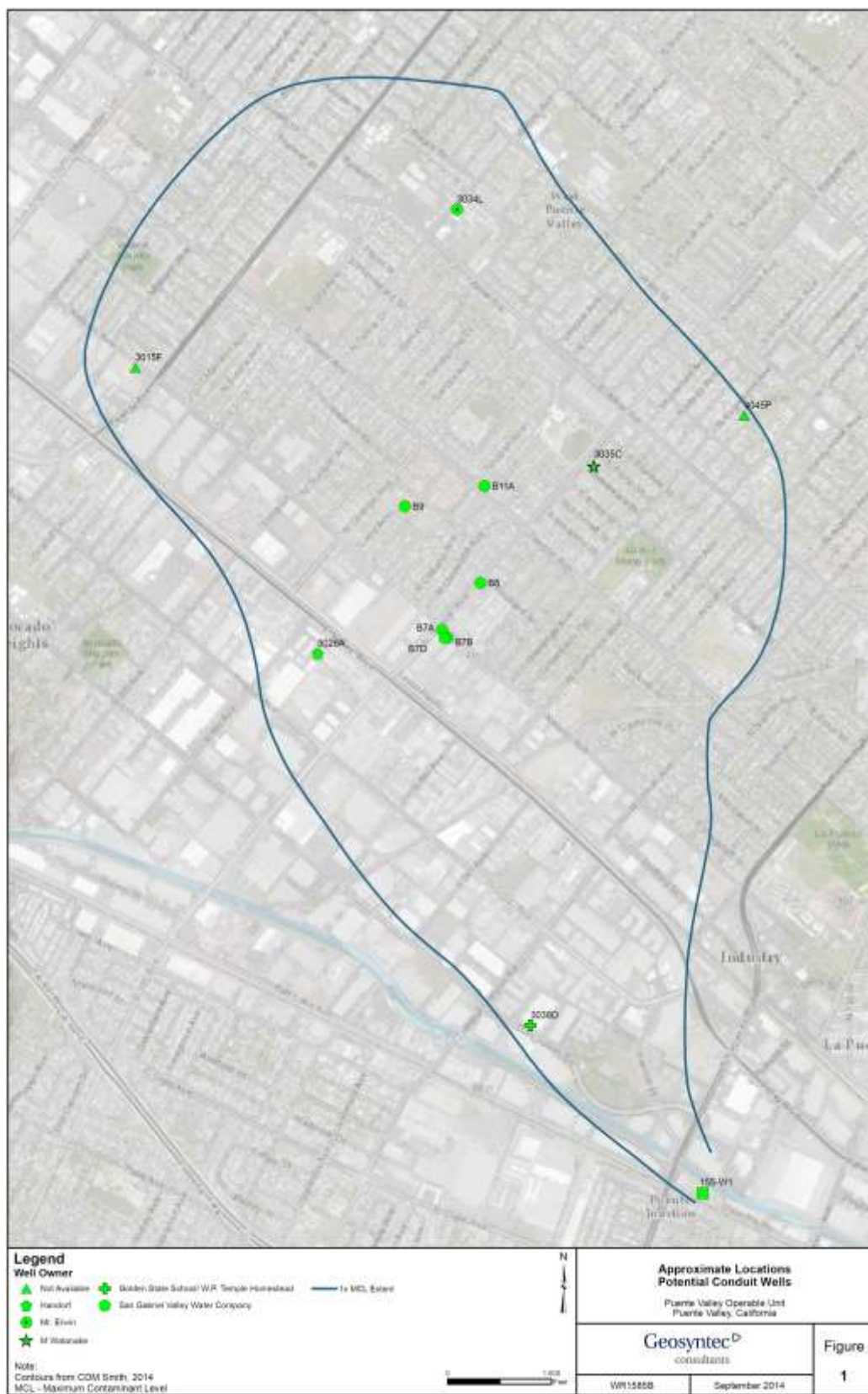


Figure 8-3: Approximate Locations of Potential Conduit Wells

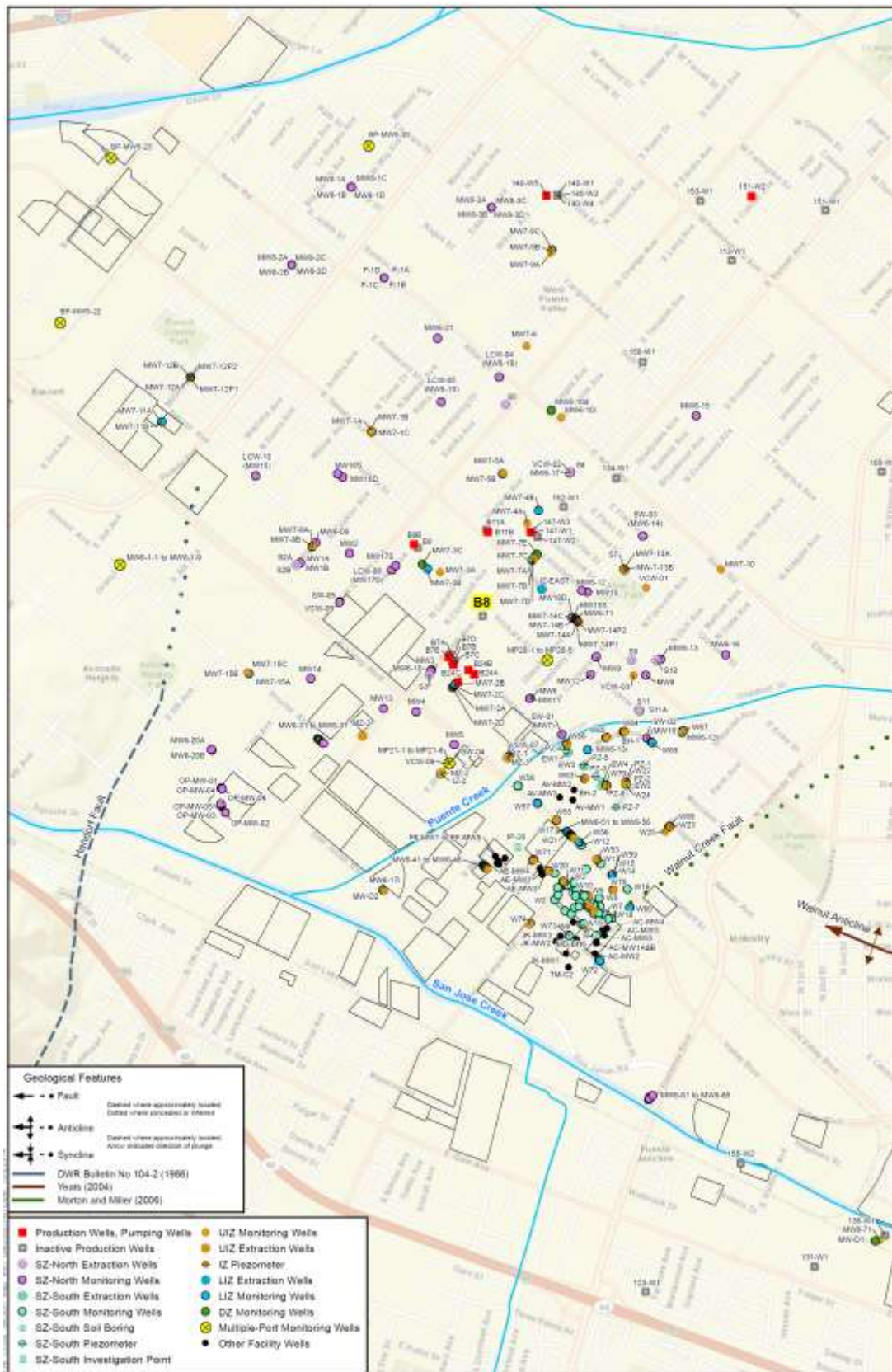


Figure 1-4: Inactive Production Well B8 Location

The temperature and spinner logs indicate a downward flow of water with groundwater entering the well in the shallow zone at a flow rate of 48 gallons per minute and exiting the well in the intermediate and deep zones.

Concentrations of PCE (37-49 µg/L), TCE (20-30 µg/L), and 1,1-DCE (7.3-16 µg/L) exceed their respective MCLs. Hexavalent chromium, 1,1-DCA, and 1,4-dioxane were detected at concentrations below their respective MCLs/NLs. Results of this investigation indicate that shallow zone contamination is entering well B8 and exiting the well screen intervals in the intermediate and deep zones (Geosyntec, 2014b). Based on this assessment, the California Division of Drinking water requested that SGVWC destroy well B8 in accordance with applicable requirements to prevent further vertical migration. As of the writing of this FYR, well B8 has not yet been destroyed.

Based on the results of the B8 investigation, EPA requested SGVWC to investigate inactive production wells B7A, B7B, B9, and B11A using the same approach used for well B8. Investigations for these inactive production wells have not been conducted. However, SGVWC agreed to destroy B7A, B7B, B7C, B7D, B8, B9A, and B11A in the near term and to destroy B11B upon startup of the IZ Remedy.

The inactive SWS wells, 147W2 and 155W1, were reported to be destroyed or filled with concrete. Verification of this has not been performed. SWS well 147W3 is an active production well and an assessment of it was attempted but not completed in 2014.

VAPOR INTRUSION

The Vapor Intrusion Study Area was identified by EPA due to its proximity to the former TRW Benchmark property and includes ten properties with commercial/industrial buildings located south of Valley Boulevard (Figure 1-5).



Figure 1-5: Vapor intrusion Study Area

Vadose zone soil gas samples were collected between September 2012 and February 2013 and analyzed for VOCs. The samples were collected at various depths ranging from 5 to 30 feet bgs. Results were compared to a soil screening level based on the commercial/industrial EPA Regional Screening Levels (RSLs) and a default soil vapor to indoor air attenuation factor of 0.01. The results indicated that the maximum concentrations of VOCs in soil vapor were detected at depths greater than 15 to 25 feet bgs and decreased from deeper to shallower depths (Table B-5). Of the VOCs detected, six chemicals had concentrations greater than their corresponding RSL in at least one sample. These six chemicals (chloroform, 1,1-DCE, 1,1,-DCA, PCE, 1,1,2-TCA, and TCE) were identified as the vapor intrusion COCs (VI COCs) for evaluating indoor air quality in subsequent years.

Table B-5: Vadose Zone Soil Vapor Results

| Compound | Maximum Concentration in Soil Vapor (µg/L) | Sampling Depth for Maximum Concentration (feet bgs) | Soil Vapor Screening Level (µg/L) |
|----------------------------------|--|---|-----------------------------------|
| Acetone | 0.54 | 16 | 14,000 |
| Benzene | 0.066 | 16 | 0.16 |
| Carbon Disulfide | 0.89 | 16 | 310 |
| Carbon Tetrachloride | 0.054 | 30 | 0.2 |
| Chlorobenzene | 0.031 | 30 | 22 |
| Chloroform | 0.13 | 30 | 0.053 |
| Dichlorodifluoromethane | 0.06 | 28 | 44 |
| 1,1-Dichloroethane | 6.5 | 28 | 0.77 |
| 1,1-Dichloroethene | 360 | 28 | 88 |
| <i>cis</i> -1,2-Dichloroethene | 0.59 | 30 | 26 |
| <i>trans</i> -1,2-Dichloroethene | 0.092 | 28 | 26 |
| 1,4-Dioxane | 0.013 | 30 | 0.16 |
| Ethylbenzene | 0.043 | 5.25 | 0.49 |
| Methyl Ethyl Ketone | 0.18 | 5.25 | 2,200 |
| Methylene Chloride | 2.9 | 15 | 120 |
| Tetrachloroethene | 72 | 30 | 4.7 |
| Toluene | 0.28 | 28.5 | 2,200 |
| 1,1,1-Trichloroethane | 290 | 28 | 2,200 |
| 1,1,2-Trichloroethane | 0.66 | 30 | 0.077 |
| Trichloroethylene | 340 | 30 | 0.3 |
| Trichlorofluoromethane | 0.85 | 28 | 310 |
| Trifluorotrchloroethane | 1.7 | 15 | NA |
| 1,2,4-Trimethylbenzene | 0.057 | 5.25 | 3.1 |
| Vinyl Chloride | 0.067 | 29.5 | 0.28 |
| m- and p-Xylene | 0.1 | 5.25 | 44 |
| o-Xylene | 0.054 | 5.25 | 44 |

Shading indicates maximum concentrations greater than screening levels.

Soil vapor screening levels based on the commercial/industrial screening level with an attenuation factor of 0.01 (e.g. RSL x 0.01).

Indoor air sampling first occurred in December 2012. A total of 53 indoor air and 6 outdoor air samples were collected and analyzed for VOCs using EPA Method TO-15. The indoor air sample results were compared to outdoor air concentrations and the EPA RSLs for commercial/industrial air. Comparison to outdoor air concentrations evaluates the impact of outdoor air to indoor air and can also help assess whether indoor VOC sources or vapor intrusion pathways are present. If indoor air concentrations are greater than outdoor air concentrations, this may be an indication of either indoor VOC sources or a vapor intrusion pathway. Of the VI COCs detected in indoor air, only chloroform was detected in indoor air at concentrations exceeding both outdoor air concentrations and the commercial/industrial RSL. PCE was detected below the commercial/industrial RSL of 47 µg/m³ with a maximum concentration of 14 µg/m³ in Building 2B. TCE was detected below its RSL of 3 µg/m³ with maximum concentrations of 1.6 µg/m³ in Building 6D&E. An additional round of samples collected in the summer was recommended.

Five buildings were resampled in July 2013: Buildings 2B, 3A, 4 (Suite A), 6 (all building suites), and 10C. Indoor air samples were collected while the building heating, ventilation, and air conditioning systems were turned off and after the systems were shut down for at least 36 hours. After the collection of indoor air samples, four sub-slab samples were collected beneath Building 6. Concentrations of TCE and other VOCs in indoor air did not exceed RSLs. However, TCE detections in indoor air, sub-slab soil vapor, and vadose zone soil vapor in the vicinity of Building 6 suggest that continued monitoring and/or risk management may be appropriate to address the potential for vapor intrusion. An additional round of indoor air sampling was recommended for Buildings 4A and 10C. Table B-6 presents a summary of detected contaminants for all buildings sampled in 2012 and 2013.

Table B-6: 2012 and 2013 Indoor and Outdoor Air and Sub-Slab Sample Results

| Sampling Date | Building | Chloroform (µg/m ³) | 1,1-DCA (µg/m ³) | 1,1-DCE (µg/m ³) | PCE (µg/m ³) | TCE (µg/m ³) | 1,1,2-TCA (µg/m ³) |
|---------------------------|----------|---------------------------------|------------------------------|------------------------------|--------------------------|--------------------------|--------------------------------|
| Indoor Air Samples | | | | | | | |
| 12/11/2012 | 1A | 0.250 | <0.081 | <0.079 | 0.4 | 0.065 J | 0.047 J |
| 12/11/2012 | 1A | 0.25 | <0.081 | <0.079 | 0.37 | 0.06 J | <0.11 |
| 12/11/2012 | 1B | 0.22 | <0.081 | 0.18 | 1.3 | 0.066 J | 0.12 |
| 12/11/2012 | 1B | 0.29 | <0.081 | <0.079 | 0.58 | 0.097 J | 4.4 |
| 12/13/2012 | 2A | 0.21 J | <0.081 | <0.079 | 0.28 J | 0.053 J | 0.044 J |
| 12/13/2012 | 2A | 0.25 | <0.081 | <0.079 | 0.31 | 0.062 J | <0.11 |
| 12/13/2012 | 2A | 0.25 | <0.081 | <0.079 | 0.35 | 0.075 J | <0.11 |
| 12/13/2012 | 2A | 2 | <0.081 | <0.079 | 0.31 | 0.067 J | 0.045 J |
| 12/13/2012 | 2A | 0.23 | <0.081 | <0.079 | 0.31 | 0.066 J | 0.045 J |
| 12/13/2012 | 2A | 0.35 | <0.081 | <0.079V | 0.31 | 0.062 J | 0.045 J |
| 12/13/2012 | 2B | 0.15 | <0.081 | <0.079 | 1.1 | 0.12 | 0.066 J |
| 7/15/2013 | 2B | 0.29 | <0.081 | <0.079 | 0.14 | 0.049 J | 0.052 J |
| 12/13/2012 | 2B | 0.16 | <0.081 | <0.079 | 14 | 0.14 | 0.058 J |
| 7/15/2013 | 2B | 0.28 | <0.081 | <0.079 | 0.1 J | 0.04 J | 0.046 J |
| 12/13/2012 | 2B | 0.18 | <0.081 | <0.079 | 14 | 0.13 | 0.068 J |
| 7/15/2013 | 2B | 0.27 | <0.081 | <0.079 | 0.11 J | 0.044 J | 0.047 J |
| 12/13/2012 | 2B | 0.13 | <0.081 | <0.079 | 1.5 | 0.11 | 0.059 J |

| Sampling Date | Building | Chloroform (µg/m³) | 1,1-DCA (µg/m³) | 1,1-DCE (µg/m³) | PCE (µg/m³) | TCE (µg/m³) | 1,1,2-TCA (µg/m³) |
|---------------|----------|--------------------|-----------------|-----------------|-------------|-------------|-------------------|
| 7/15/2013 | 2B | 0.32 | <0.081 | <0.079 | 0.12 J | 0.036 J | 0.054 J |
| 12/13/2012 | 2B | 0.17 | <0.081 | <0.079 | 0.84 | 0.12 | 0.066 J |
| 7/15/2013 | 2B | 0.3 | <0.081 | <0.079 | 0.11 J | 0.04 J | 0.056 J |
| 12/13/2012 | 2B | 0.15 | <0.081 | <0.079 | 1.1 | 0.11 | 0.063 J |
| 12/13/2012 | 3A | 0.4 | <0.081 | <0.079 | 1.5 | 0.11 | 0.1 J |
| 7/15/2013 | 3A | 0.43 | <0.081 | 0.044 J | 1 | 0.049 J | 0.073 J |
| 12/13/2012 | 3B | 0.19 J | <0.081 | <0.079 | 0.57 J | 0.083 J | <0.11 |
| 12/13/2012 | 3B | 0.16 | <0.081 | <0.079 | 0.53 | 0.087 J | 0.057 J |
| 12/13/2012 | 3C | 0.18 | <0.081 | 0.04 J | 0.32 | 0.056 J | 0.058 J |
| 12/13/2012 | 4A | 0.21 | <0.081 | <0.079 | 0.28 | 0.21 | 0.066 J |
| 7/15/2013 | 4A | 0.57 | <0.081 | <0.079 | 0.084 J | 0.74 | 0.2 |
| 12/13/2012 | 4A | 0.24 | <0.081 | <0.079 | 0.31 | 0.29 | 0.064 J |
| 7/15/2013 | 4A | 0.94 | 0.22 | 0.23 | 0.4 | 1.4 | 0.42 |
| 12/13/2012 | 4B | 0.5 | <0.081 | <0.079 | 0.3 | 0.071 J | 0.051 J |
| 12/13/2012 | 4B | 0.68 | <0.081 | <0.079 | 0.33 | 0.084 J | 0.054 J |
| 12/13/2012 | 4C | 0.2 | <0.081 | <0.079 | 0.31 | 0.077 J | 0.053 J |
| 12/13/2012 | 4C | 0.24 | <0.081 | <0.079 | 0.37 | 0.078 J | 0.052 J |
| 12/13/2012 | 4C | 0.23 | <0.081 | <0.079 | 0.33 | 0.08 J | 0.054 J |
| 12/13/2012 | 4D | 0.16 | <0.081 | <0.079 | 0.38 | 0.072 J | 0.052 J |
| 12/13/2012 | 4D | 0.16 | <0.081 | <0.079 | 0.33 | 0.065 J | 0.048 J |
| 12/11/2012 | 5 | 0.28 | <0.081 | <0.079 | 0.48 | 0.083 J | <0.11 |
| 12/11/2012 | 5 | 0.32 | <0.081 | <0.079 | 0.5 | 0.083 J | 0.14 |
| 12/11/2012 | 5 | 0.3 | <0.081 | <0.079 | 0.46 | 0.083 J | 0.14 |
| 12/11/2012 | 5 | 0.25 | <0.081 | <0.079 | 0.41 | 0.07 J | 0.093 J |
| 12/11/2012 | 5 | 0.25 | <0.081 | <0.079 | 0.4 | 0.075 J | 0.093 J |
| 12/11/2012 | 5 | 0.26 | <0.081 | <0.079 | 0.41 | 0.071 J | 0.099 J |
| 12/11/2012 | 6A | 0.71 | <0.081 | <0.079 | 0.63 | 0.17 | 0.41 |
| 7/15/2013 | 6A | 0.29 | <0.081 | <0.079 | 0.12 J | 0.08 J | 0.21 |
| 12/11/2012 | 6B | 0.4 | <0.081 | <0.079 | 0.79 | 0.3 | 0.68 |
| 7/15/2013 | 6B | 0.4 | <0.081 | 0.072 J | 0.22 | 0.18 | 0.52 |
| 12/11/2012 | 6C | 0.57 | 0.036 J | <0.079 | 1.1 | 0.37 | 0.69 |
| 7/15/2013 | 6C | 0.25 | 0.046 J | <0.079 | 0.25 | 0.28 | 0.61 |
| 12/11/2012 | 6C | 0.62 | 0.038 J | <0.079 | 1 | 0.42 | 0.73 |
| 7/15/2013 | 6C | 0.26 | 0.043 J | <0.079 | 0.26 | 0.3 | 0.64 |
| 12/11/2012 | 6D&E | 2.1 | 0.77 | 0.058 J | 1.8 | 1.6 | 3 |
| 7/15/2013 | 6D&E | 0.5 | 0.45 | 0.046 J | 1 | 1.7 | 2.8 |
| 12/11/2012 | 7 | 0.29 | <0.081 | <0.079 | 0.35 | 0.052 J | <0.11 |
| 12/11/2012 | 7 | 0.7 | <0.081 | <0.079 | 0.4 | <0.11 | <0.11 |
| 12/11/2012 | 9A | 0.28 | <0.081 | <0.079 | 0.49 | 0.082 J | <0.11 |
| 12/11/2012 | 10A | 0.27 | <0.081 | <0.079 | 0.58 | 0.085 J | <0.11 |
| 12/11/2012 | 10A | 0.29 | <0.081 | <0.079 | 0.63 | 0.083 J | 0.048 |

| Sampling Date | Building | Chloroform (µg/m³) | 1,1-DCA (µg/m³) | 1,1-DCE (µg/m³) | PCE (µg/m³) | TCE (µg/m³) | 1,1,2-TCA (µg/m³) |
|-------------------------------|----------|--------------------|-----------------|-----------------|------------------------|---------------|-------------------|
| 12/11/2012 | 10B | 0.34 | <0.081 | <0.079 | 0.54 | 0.083 J | 0.046 |
| 12/11/2012 | 10B | 0.65 | <0.081 | <0.079 | 0.52 | 0.074 J | <0.11 |
| 12/11/2012 | 10B | 0.39 <i>J</i> | <0.081 | <0.079 | 0.51 <i>J</i> | 0.11 J | <0.11 |
| 12/11/2012 | 10B | 0.3 | <0.081 | <0.079 | 0.4 | 0.073 J | <0.11 |
| 12/11/2012 | 10B | 0.29 | <0.081 | <0.079 | 0.49 | 0.083 J | 0.044 J |
| 12/11/2012 | 10C | 0.31 | <0.081 | <0.079 | 0.55 | 0.17 | 0.047 J |
| 7/15/2013 | 10C | 0.32 | <0.081 | <0.079 | 0.17 | 0.24 | 0.1 J |
| 7/15/2013 | 10C | 0.31 | <0.081 | <0.079 | 0.17 | 0.25 | 0.094 J |
| 12/11/2012 | 10C | 0.28 | <0.081 | <0.079 | 0.65 | 0.19 | 0.05 J |
| 7/15/2013 | 10C | 0.41 | <0.081 | <0.079 | 0.34 | 1.4 | 0.11 |
| 12/11/2012 | 10C | 0.37 | <0.081 | <0.079 | 0.59 | 0.19 | <0.11 |
| Outdoor Air Samples | | | | | | | |
| 12/11/2012 | 2A | 0.25 | <0.081 | <0.079 | 0.37 | 0.071 | <0.27 |
| 12/13/2012 | 2A | 0.17 | <0.081 | <0.079 | 0.33 | 0.063 | <0.27 |
| 12/11/2012 | 3A | 0.26 | <0.081 | <0.079 | 0.44 | 0.069 | <0.27 |
| 12/13/2012 | 3A | 0.2 | <0.081 | <0.079 | 0.31 | 0.057 | <0.27 |
| 12/11/2012 | 10A | 0.22 | <0.081 | 0.13 | 0.3 | 0.05 | <0.27 |
| 12/13/2012 | 10A | 0.16 | <0.081 | <0.079 | 0.29 | 0.035 | <0.27 |
| 7/15/2013 | 10C | 0.19 | <0.081 | <0.079 | 0.12 | <0.11 | <0.27 |
| 7/15/2013 | 2B | 0.2 | <0.081 | <0.079 | 0.11 | <0.11 | <0.27 |
| 7/15/2013 | 3A | 0.25 | <0.081 | <0.079 | 0.16 | <0.11 | <0.27 |
| Sub-Slab Samples | | | | | | | |
| 7/16/2013 | 6A | 2.7 | <3.2 | <3.2 | 29 | 37 | <2.2 |
| 7/16/2013 | 6B | <1.5 | <3.2 | <3.2 | 56 | 43 | <2.2 |
| 7/16/2013 | 6D&E | 7 | <3.2 | 20 | 770 J | 1300 J | 2.2 J |
| 7/16/2013 | 6D&E | 7.1 | <3.2 | 21 | 560 J | 900 J | 2.1 J |
| Commercial/Industrial Air RSL | | 0.53 | 7.7 | 880 | 47 (2.1) ¹ | 3 | 0.77 |
| Residential Air RSL | | 0.12 | 1.8 | 210 | 11 (0.48) ¹ | 0.48 | 0.18 |

Bold – Concentration greater than both commercial/industrial and residential air RSLs.

Italic – Concentration greater than residential air RSL.

< - indicates non-detect at the listed reporting limit. J – denotes an estimated value.

¹Value in parenthesis is the January 2016 California Human Health Risk Screening Level.

In September 2014, a total of ten (eight primary and two duplicate) indoor air samples and two outdoor air samples were collected; two samples from Building 4A, four samples and one duplicate from Building 6, and two samples and one duplicate from Building 10C. Outdoor air samples were collected from the roofs of Buildings 6 and 10. Indoor air was resampled in November 2014 from two suites in Building 6 due to anomalous results and slightly elevated concentrations of VOCs. No COCs were detected above laboratory reporting limits in outdoor air samples. No COCs were detected above the laboratory reporting limit in indoor air in Buildings 4A and 10C. No COCs were detected in indoor air above RSLs.

In September 2014, two sub-slab soil vapor probes were installed beneath Buildings 4A and 10C after the indoor and outdoor sampling activities were completed. A total of three samples were collected in each building to evaluate the distribution of VOCs beneath the foundations. No COCs were detected in sub-slab soil vapor at concentrations exceeding RSLs. Based on this sampling effort, further assessment of the potential for vapor intrusion is not warranted at Buildings 4A and 10C. Additional indoor monitoring was recommended for Building 6 even though concentrations were below RSLs. Table B-7 presents detected contaminants for all buildings sampled in 2014 (Geosyntec, 2015a).

Table B-7: 2014 Indoor and Outdoor Air and Sub-Slab Sample Results

| Sampling Date | Building | Chloroform (µg/m³) | 1,1-DCA (µg/m³) | 1,1-DCE (µg/m³) | PCE (µg/m³) | TCE (µg/m³) | 1,1,2-TCA (µg/m³) |
|-------------------------------|----------|--------------------|-----------------|-----------------|------------------------|-------------|-------------------|
| Indoor Air Samples | | | | | | | |
| 9/28/2014 | 4A | <0.13 U | <0.081 | <0.079 | <0.17 U1 | <0.11 U1 | <0.27 U1 |
| 9/28/2014 | 4A | <0.12 U | <0.081 U | <0.079 | <0.25 U1 | <0.11 U1 | <0.27 U1 |
| 9/28/2014 | 6A | 0.58 | <0.081 | <0.079 | <0.23 U1 | <0.15 U1 | 0.6 |
| 9/28/2014 | 6B | 0.62 | <0.081 U | <0.079 | <0.20 U1 | <0.13 U1 | <0.27 |
| 9/28/2014 | 6C | <i>0.39</i> | 0.88 | <0.079 U1 | 1.5 | <i>1.5</i> | <0.27 |
| 11/23/2014 | 6C | 5.1 | 0.58 | 0.047 J | 2.3 | <i>1.9</i> | <0.27 |
| 9/28/2014 | 6D&E | <i>0.43</i> | 0.33 | <0.079 U1 | 1.3 | <i>1.7</i> | <0.27 |
| 9/28/2014 | 6D&E | <0.32 U | <0.29 U | <0.079 U1 | <0.14 | <0.22 U1 | <0.27 |
| 11/23/2014 | 6D&E | 0.58 | 0.33 | 0.046 J | 2.1 | 2.2 | 0.027 J |
| 11/23/2014 | 6D&E | 0.53 | 0.32 | 0.047 J | 2 | <i>2.1</i> | 0.028 J |
| 9/28/2014 | 10C | <0.18 U1 | <0.081 | <0.079 U1 | <0.14 U1 | <0.11 U1 | <0.27 |
| 9/28/2014 | 10C | <0.21 U1 | <0.081 | <0.079 | <0.14 U1 | <0.11 U1 | <0.27 |
| Outdoor Air Samples | | | | | | | |
| 9/28/2014 | 6 | <0.18 U1 | <0.081 | <0.079 | <0.14 U1 | <0.27 U1 | <0.27 |
| 9/28/2014 | 10C | <0.18 U1 | <0.081 | <0.079 | <0.14 U1 | <0.11 U1 | <0.27 |
| Sub-Slab Samples | | | | | | | |
| 9/30/2014 | 4A | <1.7 | <3.2 | <3.2 | 4.7 | <2.2 | <2.2 |
| 9/30/2014 | 4A | <1.7 | <3.2 | <3.2 | 5.1 | <2.2 | <2.2 |
| 9/30/2014 | 4A | <i>0.47 J</i> | <3.2 | <3.2 | 12 | <2.2 | <2.2 |
| 9/30/2014 | 10C | <i>0.44 J</i> | <3.2 | <3.2 | 27 | <i>0.74</i> | <2.2 |
| 9/30/2014 | 10C | <1.7 | <3.2 | <3.2 | 27 | <i>0.58</i> | <2.2 |
| 9/30/2014 | 10C | <i>0.97</i> | <3.2 | <3.2 | 18 | <2.2 | <2.2 |
| Commercial/Industrial Air RSL | | 0.53 | 7.7 | 880 | 47 (2.1) ¹ | 3 | 0.77 |
| Residential Air RSL | | 0.12 | 1.8 | 210 | 11 (0.48) ¹ | 0.48 | 0.18 |

Bold – Concentration greater than both commercial/industrial and residential air RSLs (either EPA or California).

Italic – Concentration greater than residential air RSL.

< - indicates non-detect at the listed reporting limit. J – denotes an estimated value.; U1 – indicates an estimated value because of a contaminated blank.

RSL are the November 2015 EPA RSLs.

¹Value in parenthesis is the January 2016 California Human Health Risk Screening Level.

Five (four primary and one duplicate) indoor air samples and one outdoor air sample were collected from Building 6 in August 2015. Sampling was performed with HVAC off conditions except in 3 building suites where tenants were either working or access to the HVAC system was not allowed. Results indicate that indoor air conditions for the COCs except chloroform remain below commercial/industrial indoor air screening RSLs. PCE and TCE were detected above outdoor air concentrations but below RSLs. Another indoor air sampling was planned for January 2016. Table B-8 presents detected contaminants for all buildings sampled in 2015 (Geosyntec, 2015c).

Table B-8: 2015 Indoor and Outdoor Air Sampling Results

| Sampling Date | Building | Chloroform (µg/m³) | 1,1-DCA (µg/m³) | 1,1-DCE (µg/m³) | | PCE (µg/m³) | TCE (µg/m³) | 1,1,2-TCA (µg/m³) |
|--------------------------------|----------|--------------------|-----------------|-----------------|--|------------------------|-------------|-------------------|
| Indoor Air Samples | | | | | | | | |
| 8/2/2015 | 6A | 1.2 | <0.15 | <0.15 | | 0.16 | 0.071 J | <0.50 |
| 8/2/2015 | 6B | <i>0.66</i> | <0.15 | <0.15 | | 0.32 | 0.059 J | <0.51 |
| 8/2/2015 | 6C | <i>0.81</i> | 0.044 J | <0.15 | | 0.40 | 0.24 | <0.50 |
| 8/3/2015 | 6D&E | <i>0.82</i> | <0.20 | <0.20 | | 0.88 | <i>0.93</i> | <0.68 |
| 8/3/2015 | 6D&E | <i>0.80</i> | <0.15 | <0.14 | | 0.85 | <i>0.86</i> | <0.49 |
| Outdoor Air Samples | | | | | | | | |
| 8/2/2015 | 6 | 0.19 | <0.081 | <0.079 | | 0.089 J | 0.027 J | <0.27 |
| Commercial/Industrial Air RSL | | 0.53 | 7.7 | 880 | | 47 (2.1) ¹ | 3 | 0.77 |
| Residential Air RSL (Nov 2015) | | 0.12 | 1.8 | 210 | | 11 (0.48) ¹ | 0.48 | 0.18 |

Bold – Concentration greater than both commercial/industrial and residential air RSLs (either EPA or California).

Italic – Concentration greater than residential air RSL.

¹Value in parenthesis is the January 2016 California Human Health Risk Screening Level.

Two residential parcels are located within the vapor intrusion study area. Residential units on these parcels have not been evaluated for the potential for the vapor intrusion pathway. One parcel with four residential dwellings is located adjacent to the north of Building 6. In comparing the August 2015 to residential air RSLs, chloroform, PCE, and TCE concentrations exceeded residential air RSLs. An indoor air investigation for residential buildings in the vicinity of the former TRW Benchmark facility is recommended.

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Appendix C: ARAR Analysis

ARAR ANALYSIS

Section 121(d)(1)(A) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that remedial actions at CERCLA sites attain (or justify the waiver of) any federal or state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs). Federal ARARs may include requirements promulgated under any federal environmental laws. State ARARs may only include promulgated, enforceable environmental or facility-siting laws of general application that are more stringent or broader in scope than federal requirements and that are identified by the state in a timely manner. ARARs are identified on a site-specific basis from information about the chemicals at the site, the Remedial Actions (RAs) contemplated, the physical characteristics of the site, and other appropriate factors. ARARs include only substantive, not administrative, requirements and pertain only to onsite activities. There are three general categories of ARARs: chemical-specific, location-specific, and action-specific.

Chemical-specific ARARs identified in the selected remedy for the groundwater at this site within the 1998 Interim Record of Decision (ROD) and 2005 Explanation of Significant Differences (ESD), and considered for this Five-Year Review (FYR) for continued groundwater treatment, are shown in Table C-1. **Error! Reference source not found..** Contaminants with interim cleanup standards that exceed their current Maximum Contaminant Levels (MCLs) are shaded in Table C-1.

Table C-1: Summary of Groundwater ARAR Changes

| Contaminant of Concern | 1998 IROD/2005 ESD ARARs (µg/L) | Current State MCL (µg/L) | Current Federal MCL (µg/L) | Is ARAR above the current MCL? |
|---------------------------------------|---------------------------------|--------------------------|----------------------------|--------------------------------|
| 1,1-Dichloroethane | 5 | 5 | 5 | No |
| 1,1-Dichloroethene | 6 | 6 | 7 | No |
| 1,1,1-Trichloroethane | 200 | 200 | 200 | No |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 1,200 | 1,200 | - | No |
| 1,1,2-Trichloroethane | 3 | 5 | 3 | No |
| 1,1,2,2-Tetrachloroethane | 1 | 1 | 5 | No |
| 1,2-Dichlorobenzene | 600 | 600 | 600 | No |
| 1,2-Dichloroethane | 0.5 | 0.5 | 5 | No |
| 1,2-Dichloroethene (total) | 6 ¹ | 6 | 7 | No |
| N1,2-Dichloropropane | 5 | 5 | 5 | No |
| 1,2,4-Trichlorobenzene ² | 70 | 5 | 70 | Yes |
| 1,3-Dichlorobenzene | 600 | - | 600 | No |

| Contaminant of Concern | 1998 IROD/2005 ESD ARARs (µg/L) | Current State MCL (µg/L) | Current Federal MCL (µg/L) | Is ARAR above the current MCL? |
|-----------------------------------|---------------------------------|--------------------------|----------------------------|--------------------------------|
| 1,3-Dichloropropene | 0.5 | 0.5 | - | No |
| 1,4-Dichlorobenzene | 5 | 5 | - | No |
| 1,4-Dioxane ³ | 3 | - | - | N/A |
| Benzene | 1 | 1 | 5 | No |
| bis(2-Ethylhexyl)phthalate | 4 | 4 | 6 | No |
| Bromodichloromethane ⁴ | 100 | 80 | 80 | Yes |
| Bromoform ⁴ | 100 | 80 | 80 | Yes |
| Carbon Tetrachloride | 0.5 | 0.5 | 5 | No |
| Chlorobenzene | 70 | 70 | 100 | No |
| Chloroform ⁴ | 100 | 80 | 80 | Yes |
| cis-1,2-Dichloroethene | 6 | 6 | 70 | No |
| Dibromochloromethane ⁴ | 100 | 80 | 80 | Yes |
| Dibromochloropropane | 0.2 | 0.2 | 0.2 | No |
| Ethylbenzene ² | 700 | 300 | 700 | Yes |
| Methylene Chloride | 5 | 5 | 5 | No |
| Styrene | 100 | 100 | 100 | No |
| Tetrachloroethene | 5 | - | 5 | No |
| trans-1,2-Dichloroethene | 10 | 10 | 100 | No |
| Trichloroethylene | 5 | 5 | 5 | No |
| Trichlorofluoromethane | 150 | 150 | - | No |
| Toluene | 150 | 150 | 1,000 | No |
| Vinyl Chloride | 0.5 | 0.5 | 2 | No |
| Xylenes, total | 1,750 | 1,750 | 10,000 | No |

¹ Value for the cis-isomer; value for trans-isomer is 10 µg/L

² These chemicals show higher interim ROD and ESD standards than the current state MCLs. The interim ROD standard was based on the Federal criteria.

³ This is no MCL for 1,4-dioxane, however the state reduced the notification level (NL) from 3 µg/L to 1 µg/L.

⁴ These chemicals are trihalomethanes (THMs); the MCL listed is for all four THMs: chloroform, bromodichloromethane, dibromochloromethane, and bromoform.

Shading indicates contaminants with interim cleanup standards that exceed their current MCL.

Six compounds now have ROD standards that are above their respective current MCL. 1,2,4-Trichlorobenzene has not been detected above the current state MCL in the last five years. Four standards changed because the federal and state MCLs for these individual compounds were eliminated in favor of a combined MCL. Specifically, the federal and state MCLs for bromoform, chloroform, bromodichloromethane, and dichlorobromomethane were removed and are now regulated as total trihalomethanes (THM). The federal and state MCL for total THM is 80 µg/L. These compounds have not been detected above the new MCL over the past five years. Upon review of available data, this does not currently affect protectiveness. Ethylbenzene has not been detected above the current state MCL in the last five years.

Federal and state laws and regulations other than the chemical-specific ARARs that have been promulgated or changed over the past five years are described in Table C-2. There have been no revisions to laws and regulations that affect the protectiveness of the remedy.

The following ARARs have not changed since the last Five-Year Review; and therefore, do not affect protectiveness:

- Archaeological and Historic Preservation Act and implementing regulations (16 United States Code (USC) § 469, 40 Code of Federal Regulations (CFR) Part 6.301(c))
- California Fish and Game Code §§ 2080; 5650(a), (b) and (f); 12015 and 12016
- California Code of Regulations (CCR) Title 22, Division 4.5, Chapter 14: §66264.14, §66264.18(a) and (b), §66264.25, §66264.94, §66264.111-115, §66264.170-178, §66264.600-603, §§ 64431 and 64444
- Endangered Species Act and implementing regulations (15 USC §§ 1531-1544, 40 CFR § 6.302(h), 50 CFR Parts 17, 222 and 402)
- Federal Register (FR): 55 FR 8756, 55 FR 8691
- Historic Sites, Buildings and Antiquities Act and implementing regulations (16 USC §§ 461-467, 40 CFR Part 6.301(a))
- Los Angeles Regional Water Quality Control Board (LARWQCB) Table 3-8
- South Coast Air Quality Management District (SCAQMD) Rules 401, 402, and 403
- Standards Applicable to CERCLA Section 104(b)
- State Water Resources Control Board Resolution 68-16

Table C-2: Applicable or Relevant and Appropriate Requirements Evaluation

| Original ARAR | Document | Original ARAR Requirement | Revised Requirement | Revision Date (between March 2011-present) | Effect on Protectiveness |
|---|---------------------|---|---|---|--|
| LARWQCB General Permit No. CAG914001, Order No. R4-2002-0107, Waste | ESD | Regulates discharges of groundwater that is treated for removal of volatile organic compounds (VOCs) at eligible sites in Los Angeles and Ventura Counties. | Order has been rescinded and Order No. R4-2013-0043 has been enacted in its place and all major conditions remained the same. | April 7, 2013 | No effect on protectiveness. |
| SCAQMD Regulation XIII, comprising Rules 1301 through 1313 SCAQMD Rule 1401 | Interim ROD and ESD | The California Air Resources Board implements the federal and state Clean Air Act and the requirements of the California Health & Safety Code through local air quality management districts. The local agency for air pollution control, South Coast Air Quality Management District (SCAQMD), has adopted rules for air stripper emissions and construction activities. | Rule 1304.1 requires an upfront fee for Electrical Generating Facilities using the specific offset example in Rule 1304(a)(2) | Rule 1304.1: September 6, 2013 | No effect on protectiveness. |
| | | | Rule 1309 was revised to allow the re-issuance of unused reduction credits | Rule 1309: July 5, 2013 | |
| | | | Rule 1401: Administrative changes were made | Rule 1401: June 5, 2015 | |
| Water Quality Control Plan for the Los Angeles Basin Region (Basin Plan) | Interim ROD and ESD | In compliance with the Clean Water Act (CWA) and Porter-Cologne Water Quality Control Act, the Basin Plan sets water quality standards, consisting of beneficial uses, numeric and narrative water quality standards, and an anti-degradation policy (Resolution 68-16), for all surface and ground waters in the region. | The Basin Plan was revised to include Total Maximum Daily Load (TMDL) requirements; other administrative changes. | September 2011 (TMDL) January 2016 (administrative changes) | The administrative changes do not affect protectiveness. |
| CCR Title 22 | Interim ROD and ESD | Land disposal requirements of Title 22 may be applicable to the disposal of spent carbon generated during the treatment of ground water for removal of VOCs. | § 66268.40: Administrative changes | § 66268.40: February 8, 2012 and July 12, 2012 | No effect on protectiveness |
| | | | § 66268.48: Administrative changes | § 66268.48: July 12, 2012 | |

*Update not included in previous five-year review.

Appendix D: Risk Assessment Review and Toxicity Analysis

RISK ASSESSMENT REVIEW AND TOXICITY ANALYSIS

HUMAN HEALTH EXPOSURE

A human health risk assessment was completed for the San Gabriel Valley Superfund Site (Area 4), as part of the 1994 *Preliminary Baseline Risk Assessment for Puente Valley Operable Unit (OU)*. The risk assessment was reviewed to identify any changes in exposure or toxicity that would impact protectiveness.

The human health exposure pathways evaluated in the risk assessment include:

- Current and future residents exposed to volatile organic chemicals (VOCs) in groundwater through domestic use which includes ingestion, dermal contact, and inhalation (while showering, etc.). The dermal pathway was evaluated qualitatively.
- Current and future occupational and residential inhalation exposure to VOCs in indoor air from groundwater through the foundation of a building.

These exposure pathways are still valid. Note that only the exposure to VOCs in groundwater through domestic use was carried forward into the Interim Record of Decision (ROD). The risk to vapor intrusion at the time of the risk assessment was within the acceptable risk range.

VAPOR INTRUSION

EPA's understanding of contaminant migration from subsurface soil gas and/or groundwater into overlying buildings has evolved over the past decade, leading to the conclusion that vapor intrusion may pose a greater potential risk to human health than was understood when the Interim ROD was issued. EPA evaluates the potential risk for vapor intrusion using a "multiple lines of evidence" approach consistent with its 2015 vapor intrusion guidance, "OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air," OSWER Publication 9200.2-154. Indoor air sampling has been conducted for this Site and results are discussed in Section 4.2.2.

TOXICITY VALUES

EPA's Integrated Risk Information System (IRIS) has a program to update toxicity values used by the Agency in risk assessment when newer scientific information becomes available. In the past five years, there have been a number of changes to the toxicity values for certain contaminants of concern (COCs) at

the Site. To evaluate the protectiveness of the Interim ROD standards for this FYR, those standards were compared to EPA's current Regional Screening Levels (RSLs). The RSLs for cancer are chemical-specific concentrations for individual contaminants that correspond to an excess cancer risk level of 1×10^{-6} (or a Hazard Quotient [HQ] of 1 for non-carcinogens). The RSLs have been developed for a variety of exposure scenarios (e.g., residential, commercial/industrial) and use the most current toxicity values. RSLs are not de facto cleanup standards for a Superfund site, but they do provide a good indication of whether actions may be needed to address potential human health exposures. The EPA risk range is between 1×10^{-6} and 1×10^{-4} . RSL values that fall within this range were determined to be acceptable from a risk standpoint. The non-cancer RSLs correspond to a hazard index of 1. Table D-1 presents this comparison.

Table D-1: Summary of Tap Water RSLs (November 2015) for COCs at the Site

| Contaminant of Concern | RSL for cancer risk in excess of 1×10^{-6} (µg/L) | Protective cancer risk range (µg/L) | RSL for non-cancer hazard (µg/L) | Selected Interim ROD Standard (µg/L) | Is the Cleanup Standard still protective? |
|---------------------------------------|--|-------------------------------------|----------------------------------|--------------------------------------|---|
| 1,1-Dichloroethane | 2.8 | 2.8-280 | 3,800 | 5 | Yes |
| 1,1-Dichloroethene | - | - | - | 6 | N/A |
| 1,1,1-Trichloroethane | - | - | 8,000 | 200 | Yes |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | - | - | 55,000 | 1,200 | Yes |
| 1,1,2-Trichloroethane | 0.28 | 0.28-28 | 0.41 | 3 | No |
| 1,1,2,2-Tetrachloroethane | 0.076 | 0.076-7.6 | 360 | 1 | Yes |
| 1,2-Dichlorobenzene | - | - | 300 | 600 | No |
| 1,2-Dichloroethane | 0.17 | 0.17-17 | 13 | 0.5 | Yes |
| 1,2-Dichloroethene (total) | - | - | - | 6 ¹ | N/A |
| 1,2-Dichloropropane | 0.44 | 0.44-44 | 8.3 | 5 | Yes |
| 1,2,4-Trichlorobenzene | 1.2 | 1.2-120 | 4.0 | 70 | No |
| 1,3-Dichlorobenzene | - | - | - | 600 | N/A |
| 1,3-Dichloropropene | 0.47 | 0.47-47 | 39 | 0.5 | Yes |
| 1,4-Dichlorobenzene | 0.48 | 0.48-48 | 570 | 5 | Yes |
| 1,4-Dioxane ² | 0.41 | 0.46-46 | 57 | 3 | Yes |
| Benzene | 0.46 | 0.46-46 | 33 | 1 | Yes |
| bis(2-Ethylhexyl)phthalate | 5.6 | 5.6-560 | 400 | 4 | Yes |
| Bromodichloromethane ² | 0.13 | 0.13-13 | 380 | 100 | No |
| Bromoform ³ | 3.3 | 3.3-330 | 380 | 100 | Yes |
| Carbon Tetrachloride | 0.46 | 0.46-46 | 49 | 0.5 | Yes |
| Chlorobenzene | - | - | 78 | 70 | Yes |
| Chloroform ³ | 0.22 | 0.22-22 | 97 | 100 | No |
| cis-1,2-Dichloroethene | - | - | - | 6 | N/A |
| Dibromochloromethane ³ | 0.87 | 0.87-87 | 380 | 100 | No |
| Dibromochloropropane | - | - | - | 0.2 | N/A |
| Ethylbenzene | 1.5 | 1.5-150 | 810 | 700 | No |
| Methylene Chloride | 11 | 11-1,100 | 110 | 5 | Yes |
| Styrene | - | - | 1,200 | 100 | Yes |
| Tetrachloroethene | - | - | - | 5 | N/A |
| trans-1,2-Dichloroethene | - | - | - | 10 | N/A |

| Contaminant of Concern | RSL for cancer risk in excess of 1×10^{-6} (µg/L) | Protective cancer risk range (µg/L) | RSL for non-cancer hazard (µg/L) | Selected Interim ROD Standard (µg/L) | Is the Cleanup Standard still protective? |
|------------------------|--|-------------------------------------|----------------------------------|--------------------------------------|---|
| Trichloroethylene | 0.49 | 0.49-49 | 2.8 | 5 | No |
| Trichlorofluoromethane | - | - | 5,200 | 150 | Yes |
| Toluene | - | - | 1,100 | 150 | Yes |
| Vinyl Chloride | 0.019 | 0.019-1.9 | 44 | 0.5 | Yes |
| Xylenes, total | - | - | 190 | 1,750 | No |

¹Value for the cis-isomer; value for trans-isomer is 10µg/L.

²Added in the 2005 Explanation of Significant Differences

³These chemicals are trihalomethanes (THMs); the MCL listed is for the sum of all four THMs: chloroform, bromodichloromethane, dibromochloromethane, and bromoform.

Shading indicates Interim ROD standards greater than RSL.

Cancer Assessment

Any concentration below the cancer RSL indicates that cancer risk is low, while concentrations significantly above the cancer RSL may indicate an increase in cancer risk. For several COCs, the tap water RSLs for cancer risk are less than the Interim ROD standards as noted above. However for many of these COCs, the Interim ROD standards fall within the protective cancer risk range. The tap water RSLs for cancer risk are less than the Interim ROD standards and are outside of the protective cancer risk range for four COCs: bromodichloromethane, chloroform, dibromochloromethane, and ethylbenzene.

Non Cancer Assessment

Any concentration below the non-cancer RSL indicates that no adverse health effect from exposure is expected, while concentrations significantly above the non-cancer RSL may indicate an increased potential for non-cancer effects. The tap water RSLs for non-cancer hazard are less than the ROD standards for six COCs: 1,1,2-trichloroethane, 1,2-dichlorobenzene, 1,2,4-trichlorobenzene, chloroform, trichloroethylene, and xylenes. The following paragraphs discuss the impact to the protectiveness of the remedy for each of the chemicals mentioned. The most recent sampling event for all areas was September/October 2015.

- 1,1,2-Trichloroethane was detected in the intermediate zone with a maximum concentration of 0.39 µg/L, which is less than the non-cancer RSL. 1,1,2-Trichloroethane was detected in the shallow zone north with a maximum concentration of 2.3 µg/L, which is greater than the non-cancer RSL. 1,1,2-Trichloroethane was detected in the shallow zone south with a maximum concentration of 32 µg/L which is greater than the non-cancer RSL. The Interim ROD standard for 1,1,2-trichloroethane (3 µg/L) may not be protective of non-cancer risks.
- 1,2-Dichlorobenzene was not detected in the most recent and available monitoring reports for the shallow zone north and south areas and was also not present in the intermediate zone. The Interim ROD standard is the current MCL, which EPA considers protective of human health. Therefore, there is no impact to the protectiveness of the Interim ROD standard.
- 1,2,4-Trichlorobenzene was not detected in the most recent and available monitoring reports for the shallow zone north and south areas and was also not present in the intermediate zone. The

Interim ROD standard is the current MCL, which EPA considers protective of human health. Therefore, there is no impact to the protectiveness of the Interim ROD standard.

- Bromodichloromethane was not detected in the most recent and available monitoring reports for the shallow zone north and south areas and was also not present in the intermediate zone. The Interim ROD standard is lower than the current MCL which is cumulative for trihalomethanes, which EPA considers protective of human health. Since it is not present, there is no impact to the protectiveness of the Interim ROD standard.
- Chloroform was detected in the intermediate zone with a maximum concentration of 2.8 µg/L, the shallow zone north with a maximum concentration of 1.8 µg/L, and the shallow zone south with a maximum concentration of 10 µg/L. All are within the acceptable cancer risk range and significantly less than the non-cancer RSL. Therefore, there are no impacts to the protectiveness of the Interim ROD standard.
- Dibromochloromethane was not detected in the most recent and available monitoring reports for the shallow zone north and south areas and was also not present in the intermediate zone. The Interim ROD standard is the current MCL, which EPA considers protective of human health. Therefore, there is no impact to the protectiveness of the Interim ROD standard.
- Ethylbenzene was detected in the intermediate zone with a maximum concentration of 0.77 µg/L, which is within the acceptable risk range and significantly less than the non-cancer RSL. It was not detected in the shallow zone north or the south areas. Therefore, there is no impact to the protectiveness of the Interim ROD standard.
- Trichloroethylene (TCE) was detected in the intermediate zone with a maximum concentration of 120 µg/L. Trichloroethylene was detected in the shallow zone north with a maximum concentration of 310 µg/L which is above the acceptable risk range and the non-cancer RSL. Trichloroethylene was detected in the shallow zone south with a maximum concentration of 2,000 µg/L. The ROD standard is the current MCL, which EPA considers protective of human health. Therefore, there is no change to the protectiveness of the Interim ROD standard.
- Xylenes were not detected in the most recent and available monitoring reports for the shallow zone north and south areas and were also not present in the intermediate zone. The ROD standard is the current MCL, which EPA considers protective of human health. Therefore, there is no impact to the protectiveness of the Interim ROD standard.

ECOLOGICAL RISK

The risk assessment determined potential environmental receptors include vegetation and wildlife exposed to surface water in this area. However, detected VOCs will be removed from water primarily by volatilization to the atmosphere and are not expected to significantly bioaccumulate in aquatic organisms or adsorb to sediment. A comparison of concentrations detected in surface water to the corresponding chemical-specific acute and chronic Ambient Water Quality Criteria showed that the criteria are considerably higher than the detected concentrations. Therefore, no adverse impact to aquatic organisms is predicted. This conclusion is still valid.

Appendix E: Site Inspection Checklist

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | |
|--|--|
| Site name: San Gabriel Valley (Area 4) | Date of inspection: 18 Feb 2016 |
| Location: Puente Valley, Los Angeles County, CA | EPA ID: CAD980817985 |
| Agency, office, or company leading the five-year review: EPA | Weather/temperature: Cloudy/Partly Sunny/~65 F |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap; justify-content: space-between;"> <div style="width: 45%;"> <input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: <i>e.g. Groundwater monitoring</i> </div> <div style="width: 45%;"> <input type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls </div> </div> | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | |
| II. INTERVIEWS (Check all that apply): <i>No interviews conducted with O&M staff. No O&M occurring.</i> | |
| 1. O&M site manager _____ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">Name</div> <div style="text-align: center;">Title</div> <div style="text-align: center;">Date</div> </div> <div style="margin-top: 10px;"> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____ </div> <div style="margin-top: 10px;"> Problems, suggestions; <input type="checkbox"/> Report attached _____ </div> | |
| 2. O&M staff _____ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">Name</div> <div style="text-align: center;">Title</div> <div style="text-align: center;">Date</div> </div> <div style="margin-top: 10px;"> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____ </div> <div style="margin-top: 10px;"> Problems, suggestions; <input type="checkbox"/> Report attached _____ </div> | |

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency:

Contact: _____

Name

Title

Date Phone no.

Problems; suggestions; ☐ Report attached _____

Agency _____

Contact _____

Name

Title

Date Phone no.

Problems; suggestions; ☐ Report attached _____

Agency _____

Contact _____

Name

Title

Date Phone no.

Problems; suggestions; ☐ Report attached _____

Agency _____

Contact _____

Name

Title

Date Phone no.

Problems; suggestions; ☐ Report attached _____

| | | |
|---|--|--|
| 4. | Other interviews (optional) <input type="checkbox"/> Report attached. | |
| | <i>No interviews were conducted.</i> | |
| | | |
| | | |
| | | |
| | | |
| III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply) | | |
| 1. | O&M Documents <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs </div> <div style="width: 30%;"> <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available </div> <div style="width: 30%;"> <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date </div> <div style="width: 30%;"> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A </div> </div> <p>Remarks: <i>As-built drawings are available for the intermediate zone extraction wells and pipeline.</i></p> | |
| 2. | Site-Specific Health and Safety Plan <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> Contingency plan/emergency response plan <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks _____ | |
| 3. | O&M and OSHA Training Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____ | |
| 4. | Permits and Service Agreements <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ </div> <div style="width: 30%;"> <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available </div> <div style="width: 30%;"> <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date </div> <div style="width: 30%;"> <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A </div> </div> <p>Remarks _____</p> | |

| | | | | | |
|-----|--|---|-------------------------------------|---|---|
| 5. | Gas Generation Records | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | Remarks _____ _____ |
| 6. | Settlement Monument Records | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | Remarks _____ _____ |
| 7. | Groundwater Monitoring Records | <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A | Remarks: <i>Groundwater monitoring reports are available.</i> |
| 8. | Leachate Extraction Records | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | Remarks _____ _____ |
| 9. | Discharge Compliance Records <div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <input type="checkbox"/> Air </div> <div style="width: 20%;"> <input type="checkbox"/> Readily available </div> <div style="width: 20%;"> <input type="checkbox"/> Up to date </div> <div style="width: 20%;"> <input checked="" type="checkbox"/> N/A </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 40%;"> <input type="checkbox"/> Water (effluent) </div> <div style="width: 20%;"> <input type="checkbox"/> Readily available </div> <div style="width: 20%;"> <input type="checkbox"/> Up to date </div> <div style="width: 20%;"> <input checked="" type="checkbox"/> N/A </div> </div> Remarks _____ _____ | | | | |
| 10. | Daily Access/Security Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | Remarks _____ _____ |

IV. O&M COSTS (N/A)

1. **O&M Organization**

- ☐ State in-house ☐ Contractor for State
- ☐ PRP in-house ☒ Contractor for PRP
- ☐ Federal Facility in-house ☐ Contractor for Federal Facility
- ☐ Other _____

2. **O&M Cost Records**

- ☐ Readily available ☐ Up to date
- ☐ Funding mechanism/agreement in place
- Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

| | | | |
|------------|----------|------------|---|
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date | Date | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date | Date | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date | Date | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date | Date | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date | Date | Total cost | |

| | |
|--|--|
| 3. | Unanticipated or Unusually High O&M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ _____ |
| V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Fencing | |
| 1. | Fencing damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks: <i>No fencing around proposed location of the Shallow Zone North treatment facility. Fencing surrounds proposed location of Shallow Zone South and Intermediate Zone treatment facility. This fence looks new.</i> _____ |
| B. Other Access Restrictions <i>No other access restrictions are currently in place.</i> | |
| 1. | Signs and other security measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks _____ _____ |

C. Institutional Controls (ICs)**1. Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☒ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____

Frequency _____

Responsible party/agency _____

Contact _____

Name

Title

Date Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☒ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

2. Adequacy

☐ ICs are adequate

☐ ICs are inadequate

☒ N/A

Remarks _____

| | | | |
|---|-------------------------------------|--|--|
| D. General | | | |
| 1. | Vandalism/trespassing | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | Remarks _____ _____ |
| 2. | Land use changes on site | <input checked="" type="checkbox"/> N/A | Remarks: <i>Proposed locations for the treatment facilities have changed since the last five-year review.</i> _____ |
| 3. | Land use changes off site | <input checked="" type="checkbox"/> N/A | Remarks _____ _____ |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads | | | |
| | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A | |
| 1. | Roads damaged | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | Remarks _____ _____ |
| B. Other Site Conditions | | | |
| <p>Remarks: <i>The extraction wells viewed during the site visit varied in location; some were in the road and some were located on the sidewalk or planting/parking strip. For those located in the road, some of the roads were quite busy with lots of traffic that could impact ease of maintenance.</i></p> <p><i>The proposed locations for the treatment facilities were on current vacant lots. The Shallow Zone North proposed site location was located between two strip malls along a busy street. The lot was not fenced and was recently mowed. The Shallow Zone South and Intermediate Zone proposed treatment facility location was located in an industrial area adjacent to railroad tracks. The lot was fenced. A crew was present cleaning up the site upon arrival of the site visit team.</i></p> | | | |

** Sections VII & VIII of this checklist are not applicable for this site and were left blank in this form **

| | |
|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Groundwater Extraction Wells, Pumps, and Pipelines <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. | Pumps, Wellhead Plumbing, and Electrical <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks: <i>Shallow Zone North extraction wells do not have pumps, plumbing or electrical. Shallow Zone South wells do not have pumps, plumbing, or electrical. Intermediate Zone wells do have pumps, control panels (at four of six wells), vent pipes, and sampling ports. These appear to be in good condition.</i> <hr/> |
| 2. | Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks: <i>The pipeline for the Intermediate Zone extraction wells were underground and could not be inspected. Pipelines that were visible in the extraction well vaults appeared to be in good condition.</i> <hr/> |
| 3. | Spare Parts and Equipment <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ <hr/> |
| B. Surface Water Collection Structures, Pumps, and Pipelines <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. | Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ <hr/> |
| 2. | Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ <hr/> |

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks _____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters _____

☐ Additive (e.g., chelation agent, flocculent) _____

☐ Others _____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually _____

☐ Quantity of surface water treated annually _____

Remarks: *No treatment facility has been constructed. For the Shallow Zone North, the proposed treatment train includes advanced oxidation, carbon adsorbers, and ion exchange. For the Intermediate Zone and Shallow Zone South, the proposed treatment train was not identified during the site visit nor presented in documents reviewed.*

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☒ Good condition ☐ Needs Maintenance

Remarks: *For the Intermediate Zone, all extraction wells have pumps and four wells have associated control panels. These appear to be in good condition and are locked. The Shallow Zone South wells do not have pumps or any other associated appurtenances. Extraction wells for the Shallow Zone North do not have any pumps.*

| | |
|---------------------------|--|
| 3. | Tanks, Vaults, Storage Vessels <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____ |
| 4. | Discharge Structure and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ |
| 5. | Treatment Building(s) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks: <i>No treatment facilities have been constructed.</i> _____ |
| 6. | Monitoring Wells <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks: <i>All wells viewed were locked with the exception of EW-2 and PZ-2. There was no lock and the cap was not properly secured for either of these wells In order to access the well, one would need tools to open the manhole.</i> _____ |
| D. Monitoring Data | |
| 1. | Monitoring Data <input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality <i>To date, wells are sampled semi-annually March and September, generally. These results are presented in an annual report.</i> |
| 2. | Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining <i>Monitoring data needs to be evaluated to determine whether the plume is migrating and/or expanding because there is no active remediation occurring.</i> |

D. Monitored Natural Attenuation - N/A**1. Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☒ N/A

Remarks _____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

No other remedies are currently associated with this site.

XI. OVERALL OBSERVATIONS**A. Implementation of the Remedy**

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The ROD requires containment of VOC-contaminated groundwater in the shallow and intermediate zones at the mouth of the valley. The 2005 ESD added two COCs: 1,4-dioxane and perchlorate. Components of the remedy include groundwater extraction, treatment of extracted groundwater, conveyance and discharge of treated groundwater, and monitoring.

Extraction wells have been installed for all remedies (Intermediate Zone, Shallow Zone South, and Shallow Zone North); however there are no treatment plants for which the extracted groundwater can be treated. Pipelines were installed for the Intermediate Zone extraction wells to convey contaminated groundwater to a former treatment plant location. However, this treatment plant location has changed and has not yet been constructed and additional piping will need to be installed to the new treatment plant location. Groundwater monitoring has occurred in all zones on a semi-annual basis.

In addition, the former TRW Benchmark facility (former circuit board manufacturing facility) located within this site was a state cleanup that transferred to EPA oversight since the last five-year review. Contaminants at this site are VOCs, 1, 4 dioxane, and hexavalent chromium. Indoor air investigations were conducted in 2012-2016 in the commercial buildings surrounding the former TRW Benchmark facility. Results from this investigation indicate low levels of TCE is present in indoor air in one commercial building; sub-slab samples had higher TCE concentrations. This building is sampled every 6 months. No adjacent residential buildings have been investigated for indoor air.

| | |
|-----------|--|
| B. | Adequacy of O&M |
| | <p>Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p><i>The only O&M activities occurring are maintenance of the extraction and monitoring well network. There is currently no treatment for the extracted water so there is no O&M for that aspect.</i></p> |
| C. | Early Indicators of Potential Remedy Problems |
| | <p>Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><i>There has not been any extraction of groundwater. Therefore, containment is not occurring and the uncontrolled contaminated groundwater plumes continue to impact existing production wells. Several production wells within the site footprint have been taken off-line and many are slated to be destroyed because they may provide a conduit for contamination to migrate to deeper and cleaner water zones. Contaminated groundwater has impacted active production wells B11B and 147-W3. Well B11B currently has an air stripper to treated VOCs, but there is no treatment for 1,4-dioxane. Well 147-W3 has no pre-treatment prior to entering the water distribution system. These productions wells currently meet drinking water standards.</i></p> |
| D. | Opportunities for Optimization |
| | <p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><i>Monitoring of wells includes the use of removable pumps and hydrosleeves. There are currently no additional opportunities for optimization. Once the treatment facilities are on-line, optimization can be evaluated.</i></p> |

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Appendix F: Site Inspection Trip Report

San Gabriel Valley Area 4 (Puente Valley OU), Los Angeles County, California

1. INTRODUCTION

- a. Date of Visit: 18 February 2016
- b. Location: Various locations within the Puente Valley OU
- c. Purpose: A site visit was conducted to visually inspect and document the conditions of the remedy, the site, and the surrounding area for inclusion into the Five-Year Review Report.
- d. Participants:

Raymond Chavira USEPA, RPM

Marlowe LaubachUSACE, Seattle District Chemical Engineer

Scott Parsons Tetrtech, Project Manager

Tatiana MoiseevaTetrtech, Project Engineer

Tom Wright GES, Project Manager

Robert HollidayGES, Remedial Services Technician

2. SUMMARY

A site visit to the Puente Valley OU was conducted on 18 February 2016. The participants viewed the proposed locations of treatment facilities, existing monitoring and extraction wells, and the former TRW Benchmark Technology location, which has recently been included within the remedy. Currently only groundwater monitoring is conducted within the Puente Valley OU. Treatment of contaminated groundwater is expected to begin in 2019 pending approval of final treatment system

designs. In addition, the former TRW Benchmark facility was visited to view the locations of the indoor air investigations, groundwater monitoring wells, pilot study wells, and former soil vapor extraction system locations. Photos taken during the site visit are attached.

3. DISCUSSION

Ms. Laubach and Mr. Chavira arrived at the proposed treatment plant facility location on Amar Road in the City of La Puente for the Shallow Zone North part of the PVOU remedy around 10 am. There they met Mr. Parsons and Ms. Moiseeva with Tetrattech, consultants for UTC/Carrier. The proposed treatment facility will include pre-treatment, advanced oxidation, carbon filters, and ionic exchange, and re-injection of the treated groundwater. The area is currently a vacant lot between two strip malls on a busy street and apartments to the north. Landscaping is performed monthly to keep the lot tidy; as evidenced by the fresh grass clippings. No fencing is present around the lot. The group viewed a cluster well; P1-A, B, C, D located on the lot, with A being the shallowest and D being the deepest. The wells had locks and the manhole was secured. Monitoring of the wells occurs twice a year.

The group drove to view several extraction wells.

- S-5. This extraction well is located near the toe of the plume and is the most downgradient extraction well. The locks looked new. Ms. Moiseeva mentioned that the locks sometimes rust and need replacement. This extraction well was located in the grassy section of the sidewalk accessible via manhole. In order for this well to be a fully functioning extraction well, a vault will need to be constructed to house the well, pump, valving, flow meter, and other instrumentation. The control panel will also need to be located nearby. Also, the extraction well will need to be plumbed to the treatment plant.
- S-10. This extraction well was last sampled using a hydrosleeve. This well was properly secured. Again for this well to be a fully functioning extraction well, a vault will need to be constructed and plumbed to the treatment plant.
- S-3. This extraction well was located in a very busy street. Ms. Laubach and Mr. Chavira later visited this area on foot for a closer look. Two additional monitoring wells are located in the street near this extraction well.
- S-2A and S-2B. These wells are located on the same street approximately 500 feet from each other. These wells are screened from 75 – 105 feet. Per Ms. Moiseeva, the depth to water was 99 feet in S-2A and 92 feet in S-2B at the last water level measurement. The total depth of both the wells is 110 feet.

Next Ms. Laubach and Mr. Chavira went to the former TRW Benchmark facility located on Turnbull Canyon Road in the City of Industry. The pair viewed the commercial buildings where indoor air sampling occurred, the area where monitoring and vapor wells were installed, and the area where an upcoming in-situ pilot study will be located. The pair also viewed the area where a former SVE system was housed to treat the top 10 feet of soil and SVE well locations that were still in place. The area viewed is located within a loading/unloading area for the adjacent commercial buildings. Not many trucks were loading/unloading during the time of the visit but this area could be quite busy.

At approximately 1 pm, Ms. Laubach and Mr. Chavira met Tom Wright and Robert Holliday with GES at a vacant lot on Hudson Ave in the City of Industry. The lot is the planned location for the Shallow Zone South and Intermediate Zone groundwater treatment facilities. The location was enclosed by a chain-link fence and appeared to be recently mowed and cleaned. GES is the new consultant for Northrup Grumman responsible for operations and maintenance of the monitoring and extraction wells, landscaping, and semi-annual sampling of the wells.

The group then drove to view several extraction wells.

- EW-2. The manhole for EW-2 was opened and observed that there was no lock on this well and the cap was loose. An adjacent well, PZ-2, was also opened. Again there was no lock on this well and the cap was loose.
- IZ-East. This well was located within a vault. The well appeared in good condition. There were long lengths of cords within the vault; transducer wires and sampling hoses. In addition to the well vault, a sampling port, control panel, and vent line were also inspected. These appeared to be in good condition.
- IZ-1 and MZ-1. These wells were located in vaults in the middle of the road, so the vaults were not opened. The control panel, sample ports, and vent pipes were properly located and appeared to be in good condition.
- IZ-2 and MZ-2. These wells were located in vaults in the middle of the road, so the vaults were not opened. The control panel, sample ports, and vent pipes were properly located. The sample ports and vent pipes were not labeled so it was not explicitly clear which well corresponded to which sample ports and vent pipes.
- MZ-3. This well was located in the sidewalk and was opened. A large diameter pipe was observed in the vault. The control panel, sample port, and vent pipe were properly located and in good condition.

The group also passed by the B7 production well location, where the intermediate zone treatment plant was previously proposed to be sited. B-7E is an active production well. There is an air stripper on property. Well B7C appeared off-line. A pipeline was constructed in 2009, which plumbs the existing extraction wells to the B7 plant location.

Ms. Laubach and Mr. Chavira also visited the following productions well locations:

- B-8: A technical memo was prepared by Northrop Grumman showing shallow contamination was migrating to the deeper water bearing zones suggesting that inactive production wells provide a conduit for contaminant migration. Because of this, production well B-8 is slated for well destruction.
- B-11B: This production well is currently being used by San Gabriel Valley Water Company. The well is currently treated for VOCs using an air stripper. However, there have been detections of 1,4-dioxane.
- B-11A: This well is located in the same fenced area as B-11A. This well is currently not being used.

- 147-W3: This production well is currently being used. No treatment was observed. Contaminants present in the area of this well include VOCs and hexavalent chromium.
- 147-W2: This production well is not in use. It is unknown whether this well was properly destroyed.

The site visit ended at approximately 3 pm.

4. ACTIONS

The USACE will incorporate information obtained from the site visit into the Five-Year Review report.

Marlowe Laubach

Chemical Engineer

CENWS-EN-TS-ET

Site Visit Photos



Shallow zone north treatment plant proposed site



Cluster well P1-A, B, C, D



Extraction well S-5



Extraction well S-10



Extraction well S-2A



Extraction well S-3 in the foreground; wells MW6-10 and MW-03 in the background



Former TRW Benchmark Facility Property



TRW Benchmark facility monitoring wells and upcoming pilot study location



SVE well



Former SVE treatment plant location



Proposed treatment facility location for Shallow Zone South and Intermediate Zone remedies



Extraction well, EW-2. Note: No lock observed.



Well PZ-2 (located next to EW-2). Note: No lock observed.



Production well B7C and associated air stripper



Production well, B7E



Extraction pipeline vent pipe



Well IZ-East vault



Well IZ-East



IZ-East control panel



IZ-East vent pipe



IZ-East sample port



MZ-1 vault



IZ-1 vault



MZ-1 and IZ-1 vent pipes (taller enclosures) and sample ports (shorter enclosures)



IZ-2 and MZ-2 well vaults



Control panel for wells IZ-2 and MZ-2



IZ-2 vent pipe and sample port



MZ-2 vent pipe and sample port



MZ-3 vault



Well MZ-3



MZ-3 sample port



MZ-3 control panel



Production well, B-8, control panel



Production well, B-8 manhole



Production well 147-W3 well house



Former production well 147-W2



Production well B11B with air stripper



Production well B-11A, currently shut down